
BUTLER UNIVERSITY
SUMIT PATEL

Mission Statement

The mission of the College of Pharmacy and Health Sciences (COPHS) is to provide effective educational experiences in the health sciences. By so doing, the college facilitates the development of life-long learners with a liberal arts foundation who are able to serve society as dedicated, competent health professionals and community leaders.

Values

- **Professionally focused—inspire with excellence in teaching and model life-long learning**
  We have a passion for our life work and have dedicated our careers to training the next generation of health care providers and educators. We look for new ways to improve learning, and we adapt to the need for new knowledge, skills, and attitudes. We share our practical experiences with our students so that what they learn is directly connected to actual patient care or to our scholarship. We utilize real-life experiences wherever possible so that students develop an appreciation for the patient and societal variables that add complexity to care of an individual or of a population. As faculty, we have developed a collaborative learning environment and are respectful and supportive of one another.
- **Student focused—dedicated to our students**
  We are dedicated to our students and are committed to their development, both inside and outside the classroom, with teaching, advising, project oversight, and experiential learning.
- **Patient focused—dedicated to our patients and our professions**
  We are experienced health care practitioners and investigators who exude a high regard for patient care that is transmitted to our students. We teach others so our professions can excel and provide better patient care and research each day.

Goals

- **Education and Practice:** Advance the practice of our health care professions and the importance of an interdisciplinary approach by providing effective and innovative programs for undergraduate, graduate, and professional-level learners.
- **Research and Scholarly Activity:** Conduct focused research and scholarly activity that is consistent with our expertise and tied to student experiences.
- **Public Health, Service, and Leadership:** Foster leadership and service for students, faculty, and staff through public health-related community outreach, university and college service, and involvement in professional organizations.
- **Employer of Choice:** Create an employment environment that provides leadership, personal growth, and resources to be a desired place of employment for the ongoing vitality of our programs.
- **Collaboration:** Develop collaborations to increase the reach and effectiveness of our programs and public health initiatives.

Administration

Mary H. Andritz, Pharm.D., dean; Bruce D. Clayton, Pharm.D., associate dean; Bonnie K. Brown, Pharm.D., assistant dean for student affairs; Pamela L. Crowell, Ph.D., department chair of Pharmaceutical Sciences; Julia M. Koehler, Pharm.D., associate dean for clinical education and external affiliations; Jane M. Gervasio, Pharm.D., department chair of pharmacy practice; Michael S. Roscoe Ph.D., M.P.A.S., assistant dean for interprofessional education and chair, department of health sciences; Jennifer A. Snyder, M.P.A.S., director of the physician assistant program.

Professors

Mary H. Andritz, Pharm.D.; Bruce D. Clayton, Pharm.D.; Pamela L. Crowell, Ph.D.; Julia M. Koehler, Pharm.D.; Jennifer A. Snyder, M.P.A.S.; Michael A. Vance, Ph.D.; Jeanne H. Van Tyle, Pharm.D.; W. Kent Van Tyle, Ph.D.

Associate Professors
Jarrett R. Amsden, Pharm.D.; Alex J. Ansara, Pharm.D.; Meghan M. Bodenberg, Pharm.D.; Bonnie K. Brown, Pharm.D.; Henry F. Cole, Ph.D.; Nandita G. Das, Ph.D.; Sudip K. Das, Ph.D.; Alexandre M. Erkine, Ph.D.; Donald R Frosch, M.S.; Dennis C. Gardner, Pharm.D.; Jane M. Gervasio, Pharm.D.; Todd W. Hrubey, Ph.D.; Joseph K. Jordan, Pharm.D.; Laurence A. Kennedy, Ph.D.; Chad A. Knoderer, Pharm.D.; John A. Lucich, M.D.; Carrie M. Maffeo, Pharm.D.; Laurie L. Pylitt, M.H.P.E.; Carriann E. Richey-Smith, Pharm.D.; Michael S. Roscoe, Ph.D.; Kevin M. Tuohy, Pharm.D.

Assistant Professors
Erin L. Albert, Pharm.D., M.B.A., J.D.; Kendra M. Atkinson, Pharm.D.; Kimberly M. Beck, Ph.D.; Tracy J. Costello, Pharm.D.; Medhane G. Cumbay, Ph.D.; Lauren M. Czosnowski, Pharm.D.; Patricia S. Devine, Pharm.D.; Stephanie L. Enz, Pharm.D.; Hala M. Fadda, Ph.D.; Samuel L. Gurevitz, Pharm.D.; Carolyn M. Jacobs-Jung, Pharm.D.; Kena J. Lanham, Pharm.D.; Larry W. Lynn, M.D.; Annette T. McFarland, Pharm.D.; Kristen R. Nichols, Pharm.D.; Sarah A. Nisly, Pharm.D.; Angela V. Ockerman, Pharm.D.; Emily C. Papineau, Pharm.D.; Sheel M. Patel, Pharm.D.; Amy S. Peak, Pharm.D.; Cathy M. Ramey, Pharm.D.; Darin C. Ramsey, Pharm.D.; Jason T. Range, J.D., Ph.D.; David J. Reeves, Pharm.D.; Laura F. Ruekert, Pharm.D.; Priscilla T. Ryder, Ph.D.; Lindsay M. Saum, Pharm.D.; Michele A. Schultz, M.P.A.S.; Dane L. Shiltz, Pharm.D.; Tracy L. Sprunger, Pharm.D.; Daniel P. Sturm, M.M.S.; Alison M. Walton, Pharm.D.; Jessica E. Wilhoite, Pharm.D.; Kristal L. Williams, Pharm.D.; Deborah S. Zeitlin, Pharm.D.; Jennifer S. Zorn, M.S.

Instructors
Jennifer R. Guthrie, B.S.H.S.; Jennifer S. Myers, B.S.N.; Margaret S. Stratford, Pharm.D.

History

Butler University's College of Pharmacy and Health Sciences had its origin in 1904 with the founding of the Winona Technical Institute. Subsequently, the pharmacy department separated from the institute to become the Indianapolis College of Pharmacy, one of the first pharmacy colleges in the country to adopt a four-year curriculum. In 1945, the Indianapolis College of Pharmacy affiliated with Butler University. With the completion of a new pharmacy building in 1951, the college moved to the Butler campus. It celebrated the centennial of its founding in 2004. The original building was extensively renovated in 2007–2009. A new addition doubled the building size. Teaching laboratories, research laboratories, classrooms, and offices were added, renovated, and upgraded into a state-of-the-art facility.

In 1994, the College of Pharmacy and Health Sciences collaborated with Methodist Hospital to develop a physician assistant (PA) program. Today, the PA program is operated solely by Butler University, which administers all aspects of didactic training on Butler University's campus. Students now complete a three-year professional phase of training in classes of about 50 students each. Graduates are awarded a Master of Physician Assistant Studies degree.

Accreditation

The Butler University College of Pharmacy and Health Sciences is a member of the American Association of Colleges of Pharmacy and the Physician Assistant Education Association. The pharmacy program is accredited by the Accreditation Council for Pharmacy Education (ACPE), and the physician assistant program is accredited by the Accreditation Review Commission on Education for the Physician Assistant (ARC-PA).

Licensure and Experience Requirements

To become a licensed pharmacist in Indiana, a person must obtain a passing grade on the North American Pharmacy Licensure Examination (NAPLEX) or, with Pharmacy Board approval, reciprocate an existing license that was obtained through examination in another state. To qualify for the NAPLEX examination, a person must be a graduate of an ACPE-accredited college of pharmacy, be at least 18 years of age, and be of good moral character. Persons convicted of a felony may not be eligible for licensure in Indiana. In order to participate in the experiential portion of the curriculum, students are required to submit the results of a background check for felony and/

or misdemeanor convictions conducted by an independent agency. Students may be restricted from participating at certain experiential sites as a result of this information.

To become licensed as a physician assistant in Indiana, a person must have successfully completed an accredited educational program for physician assistants and must have passed the Physician Assistant National Certifying Examination (PANCE). Temporary certification may be granted to an individual who has graduated from an accredited program but has not yet taken the certifying examination, or is awaiting the results of the examination.

Degree Programs

The College of Pharmacy and Health Sciences offers the doctor of pharmacy (Pharm.D.) degree that provides eligibility for licensure as a pharmacist. The college also offers a doctor of pharmacy with research emphasis, a doctor of pharmacy with medical Spanish emphasis, a graduate program leading to a master of science in pharmaceutical sciences degree, a doctor of pharmacy/master of science in pharmaceutical sciences degree, and a doctor of pharmacy/master of business administration program that awards both the Pharm.D. and MBA degrees upon simultaneous completion of the respective degree requirements. The College of Pharmacy and Health Sciences also offers a master of physician assistant studies (M.P.A.S.).

Doctor of Pharmacy Professional Degree

The College of Pharmacy and Health Sciences offers a doctor of pharmacy (Pharm.D.) degree program that prepares students to become advanced pharmacy practitioners who possess the knowledge and skills required to function as authorities on the use of medicines, and who can apply pharmaceutical and biomedical science to the practical problems of drug therapy. Doctor of pharmacy practitioners are capable of contributing to the interdisciplinary delivery of primary health care and can function as drug therapy information resource specialists. Students also are prepared for specialty professional studies and for graduate study in the pharmaceutical sciences.

Doctor of Pharmacy Program Student Learning Outcomes

- Apply knowledge and skills to make appropriate decisions regarding the safe and effective use of medications or the need for referral to other health care providers. These decisions should include consideration of social, economic, and cultural factors.
- Find, understand, analyze, evaluate, and use information to make informed and rational decisions.
- Effectively communicate pharmaceutical and health-related information and collaborate with other health care professionals to ensure the provision of quality patient care.
- Practice independent learning and modify ideas and behaviors based on newly acquired knowledge.
- Manage pharmacy operations including human, facilities, and fiscal resources to deliver quality patient care.
- Demonstrate ethical conduct in personal and professional settings and respect and exhibit empathy for patients' differences, values, and preferences.
- Promote health improvement, wellness and disease prevention.

Medical Spanish Student Learning Outcomes

- Effectively communicate with Spanish-speaking patients to elicit an accurate medical history, including relevant drug information.
- Effectively communicate in Spanish (both verbal and written) to provide requisite drug information to Spanish-speaking patients.
- Effectively incorporate his/her understanding of Hispanic/Latino cultural influences into patient care activities, including therapeutic recommendations and patient counseling activities with Hispanic/Latino patients

Research Track Outcomes

- Conduct a thorough literature review and write a concise summary of the literature relevant to a research project using appropriate critical thinking and analysis skills.

- Using one or two laboratory techniques, conduct laboratory experiments with sufficient proficiency so as to function with minimal supervision.
- Generate, evaluate, and interpret experimental data using the principles of scientific research integrity.
- Create and present an oral presentation summarizing the background, methods, results, and conclusions of the conducted research.

Doctor of Pharmacy Admission Requirements

Applicants to the preprofessional or professional program who are non-native English speakers are required to submit the results of the Test of Spoken English (TSE-A) or Test of English as a Foriegn Language (TOEFL) scores.

The doctor of pharmacy curriculum requires that the student complete two preprofessional years and four professional years. Acceptance into the professional phase of the pharmacy program allows students to begin the first professional year (P1) coursework of the six-year curriculum. All students entering the fall semester of the first professional year (P1) must satisfactorily complete all math/science preprofessional coursework prior to beginning their fall P1 semester. Acceptance of students into the professional pharmacy program by either the automatic advancement option or the PharmCAS application option is contingent upon enrollment capacity limitations of the pharmacy program. The College of Pharmacy and Health Sciences reserves the option to modify its pharmacy program admission and advancement procedures and curriculum at any time. Students may consult the academic affairs office in the Pharmacy and Health Sciences Building, Room 107B, (317) 940-9969 for PCAT applications and administration dates.

Automatic Advancement Procedure for Prepharmacy Students Entering Butler University as Freshmen

Students enrolling as freshmen at Butler University and declaring prepharmacy as their initial major are eligible to be automatically admitted to the P1 year of the professional pharmacy program upon the completion of their third semester of Butler enrollment if they meet the following criteria:

- Cumulative grade point average (GPA) at Butler University greater than 3.0.
- GPA greater than 3.0 in 10 selected, critical prepharmacy courses listed below.
- No grade less than C- in any of the 10 prepharmacy courses stipulated below. For the purposes of automatic advancement, none of these 10 courses may be repeated to improve the student's GPA. If a student must repeat a course to satisfy a subsequent course prerequisite, the first grade received in the course is used in the calculation of the student's advancement GPA. (NOTE: A withdrawal during the fall semester, sophomore year from one of the 10 classes used in the automatic advancement formula will result in loss of automatic advancement.)
- Students must take the Pharmacy College Admission Test (PCAT) no later than January of their second preprofessional year and achieve a minimum composite percentile score of 55 and a writing score of 3.0.
- Successful completion of an in-person standardized interview including evaluation of verbal communication and interpersonal skills, ethical and professional characteristics, intellectual curiosity, leadership and emotional maturity, respect and empathy for others and creativity

Ten courses that determine the automatic advancement GPA:

- CH105 General Chemistry
- CH106 General Chemistry
- MA106 Calculus and Analytical Geometry
- BI105 Introductory Cell Biology
- FYS101 First Year Seminar
- COM102 Public Speaking or elective
- CH351 Organic Chemistry
- PX311 Human Anatomy
- PX100 Health Sciences Seminar
- PX325 Ethical Issues in Health Care

Eligibility for automatic advancement into the P1 year of the professional pharmacy program ceases after the student's review for professional phase admission at the end of the third semester at Butler University.

Students seeking professional pharmacy program admission by the automatic advancement option may not count more than

two courses transferred from another university or awarded through advanced placement (AP) toward the calculation of their automatic advancement GPA.

Students failing to automatically advance to the professional pharmacy program will be considered for admission to the professional program on a competitive, space-available application basis. Application for admission by this process must be made by completing an internal application available from the pharmacy dean's office. This process considers the student's cumulative GPA for all coursework completed at all universities, performance on the Pharmacy College Admissions Test (PCAT), and an attribute assessment through an interview.

Professional Phase Application Procedure for Transfer Students Entering Butler University as Preprofessional Students

Students who enter Butler University with 13 or more credit hours completed following high school graduation are classified as transfer students. Students entering Butler University as transfer students and declaring prepharmacy as their intended major are not eligible for advancement to the P1 year of the professional pharmacy program via automatic advancement. Transfer students may apply for admission into the P1 class along with all internal and external program applicants on a competitive, space-available basis. This process considers the student's cumulative GPA for all coursework completed at all universities, performance on the Pharmacy College Admissions Test (PCAT), and an attribute assessment through an interview. Application is made by completion of an internal application available from the academic affairs office, Pharmacy and Health Sciences Building, Room 107B.

Professional Phase Application Procedure for Butler University Students Not Classified as Prepharmacy Students Upon Entry into the University as Freshmen (including changes of majors)

Students enrolling at Butler University as freshmen who declare a major other than prepharmacy or COPHS exploratory are not eligible for the automatic advancement option for entry into the P1 year of the professional pharmacy program. Such students may apply for admission into the P1 class along with all internal and external program applicants on a competitive, space-available basis. This process considers the student's cumulative GPA for all coursework completed at all universities, performance on the Pharmacy College Admissions Test (PCAT), and an attribute assessment through an interview. Application is made by completion of an internal application available from the academic affairs office, Pharmacy and Health Sciences Building, Room 107B.

Students who do not gain admission into the professional pharmacy program following their fourth semester of Butler University enrollment may continue as preprofessional pharmacy students at Butler University to repeat the requisite coursework to improve their GPA, and/or they may retake the PCAT examination for a maximum of six semesters. If students elect to repeat preprofessional coursework and/or retake the PCAT examination, they will be admitted into a subsequent P1 class under the admission criteria and curriculum in effect for the P1 class they will be entering, contingent upon program enrollment capacity. To be eligible for entry into the P1 year of the pharmacy program, a student must have completed all of the preprofessional coursework required as prerequisites for enrollment in P1 professional coursework. If students fail to achieve admission into the P1 class at the end of six semesters, they will be required to change their major.

Professional Phase Application Procedure for Students Transferring to Butler University and into the Professional Pharmacy Program (P1 Year)

A student who enters Butler University with 13 or more credit hours completed following high school graduation is classified as a transfer student. Transfer students not currently enrolled at Butler University should contact the academic affairs office in the Pharmacy and Health Sciences Building, Room 107B, (317) 940-9969 for program admission information.

All students who satisfy the requirements to transfer to Butler University may apply for admission into the P1 class on a competitive, space-available basis. This process considers both the student's cumulative GPA for all coursework completed at all universities and performance on the Pharmacy College

Admissions Test (PCAT), and an attribute assessment through an interview. To be eligible for the P1 year of the pharmacy program, a student must have completed all preprofessional prerequisite coursework prior to beginning his/her P1 professional coursework. Because of the sequential nature of the doctor of pharmacy curriculum, transfer students entering the professional phase of the program must enter the program in the fall of the P1 year. Students seeking transfer admission into the P1 year of the pharmacy program must complete a PharmCAS application no later than Jan. 7 prior to the fall semester of desired P1 program admission. Information on the PharmCAS application process may be obtained at www.pharmcas.com.

Doctor of Pharmacy Degree Requirements

Students are required to complete the program of study of not less than six academic years with a minimum of 210 credit hours.

Successful completion of the professional curriculum requires that the student not exceed five credit hours of coursework with earned grades less than C (2.0) in PX and RX courses numbered 300 or higher. Additionally, the student's professional GPA must be 2.0 or higher. The professional curriculum consists of those courses designated PX and RX. The proper sequence of courses must be maintained and the prerequisites for each course satisfied. The student is responsible for making certain that he or she has completed all required courses in the curriculum.

All didactic coursework must be completed before beginning the experiential rotations in the P4 year of the curriculum.

Doctor of Pharmacy Curriculum for Classes Graduating Beginning 2014

The college reserves the right to change the Doctor of Pharmacy curriculum at the discretion of the college faculty.

First Year—Prepharmacy	Credit Hours
FYS101, First Year Seminar	3
CH105, General Chemistry (with lab)	5
MA106, Calc and Analytical Geom I	5
Core (TI, PCA, or SW)* **	3
PX100, Health Sciences Seminar	1
Total semester hours	17

Courses (Spring Semester)	Credit Hours
FYS102, First Year Seminar	3
CH106, General Chemistry (with lab)	5
BI105, Intro Cell Biology	3
Elective	2
Core (TI, PCA, or SW) * **	3
PWB, Physical Well Being	1
Total semester hours	17

Second Year—Prepharmacy	Credit Hours
GHS201-209, Global and Historical Studies	3
PX311, Human Anatomy	3
CH351, Organic Chemistry (with lab)	5
PX325, Ethical Issues in Health Care	3
Core (TI, PCA, or SW)* **	3
Total semester hours	17

*TI = Text and Ideas, PCA = Perspectives in the Creative Arts., SW = The Social World, AR Analytical Reasoning

**Students (except previously degreed students) must take at least one core course in each of the divisions listed.

Courses (Spring Semester)	Credit Hours
GHS201-209, Global and Historical Studies	3
BI325, Pathogenic Microbiology	3
CH352, Organic Chemistry (with lab)	5
PX315, Human Physiology	4
PX200, Intro to Pharmacy Practice	1
Total semester hours	16

First Professional Year (Third Year)	Credit Hours
RX301, Intro to Pharmacy Practice Experience	0
RX312, Clinical Biochemistry	4
RX316, Pathophysiology	4
BI323, Immunology	2
RX350, Intro to Pharmaceutical Care I	3
Liberal Education Elective	3
Total semester hours	16

Courses (Spring Semester)	Credit Hours
RX302 IPPE Service Learning	1
RX314 Pharmaceutical Biotechnology	3
RX318, Intro to Principles of Drug Action	5
RX320, Delivery of Health Care	3
RX324, Clinical Assessment	2
RX351, Intro to Pharmaceutical Care II	4
Total semester hours	18

Second Professional Year	Credit Hours
RX401, IPPE 2	0
RX403, Therapeutics I Case Studies	1
RX411, Prin of Drug Action I	4
RX413, Therapeutics I	3
RX415, Self-care and Health Promotion I	2
RX421, Introduction to Dosage Forms	4
Liberal Education Elective	3
Total semester hours	17

Courses (Spring Semester)	Credit Hours
RX404, Therapeutics II Case Studies	1
RX412, Prin of Drug Action II	4
RX414, Therapeutics II	3
RX416, Self-care and Health Promotion II	3
RX422, Advanced Dosage Forms	4
RX432, Personnel and Financial Management	3
Total semester hours	18

Third Professional Year	Credit Hours
RX501, IPPE III	0
RX503, Therapeutics III Case Studies	1
RX511, Principles of Drug Action III	4
RX513, Therapeutics III	3
RX522, Pharmacokinetics/Biopharm	3
RX527, Biostatistics and Research Design	3
RX6xx, Professional Electives	2
Total semester hours	16

Courses (Spring Semester)	Credit Hours
RX500, Intro to Exper Rotations	1
RX504, Therapeutics IV Case Studies	1
RX514, Therapeutics IV	3
RX528, Advanced Drug Information	2
RX523, Clinical Pharmacokinetics	3
RX526, Pharmacy and the Law	3
RXxx, Professional Electives	3
Total semester hours	16

Fourth Professional Year	Credit Hours
RX 6—Ten Experiential On-site Rotations (4 hours each)	40
• 7 Required Pharmacy Practice Rotations:	
• 1 General Medicine Rotation	
• 2 Acute Care Rotations	
• 2 Community Pharmacy Rotations	
• 1Ambulatory Care Rotation	
• 1 Underserved population Rotation	
• 3 Elective Pharmacy Practice Rotations	
RX607, Pharm.D. Senior Seminar I	1
RX608, Pharm.D. Senior Seminar II	1
Total hours	42

Total Credit Hours Required for Graduation: 210

Doctor of Pharmacy with Research Emphasis
Years 1–3 as above

Second Professional Year	Credit Hours
RX401, IPPE	0
RX403, Therapeutics I Case Studies	1
RX411, Prin of Drug Action I	4
RX413, Therapeutics I	3
RX415, Self-care and Health Promotion I	2
RX421, Introduction to Dosage Forms	4
RX602/603 Independent Study	2-3
Total semester hours	16-17

Courses (Spring Semester)	Credit Hours
RX404, Therapeutics II Case Studies	1
RX412, Prin of Drug Action II	4
RX414, Therapeutics II	3
RX416, Self-care and Health Promotion II	3
RX422, Advanced Dosage Forms	4
RX432, Personnel Management	3
Total semester hours	18

Third Professional Year	Credit Hours
RX501, IPPE	0
RX503, Therapeutics III Case Studies	1
RX511, Principles of Drug Action III	4
RX513, Therapeutics III	3
RX522, Pharmacokinetics/Biopharm	3
RX527, Biostatistics and Research Design	3
RX, Pharmaceutical Science elective	2-3
RX634, Seminars in Pharm Sci	1
Total semester hours	17-18

Courses (Spring Semester)	Credit Hours
RX500, Intro to Exper Rotations	1
RX504, Therapeutics IV Case Studies	1
RX514, Therapeutics IV	3
RX528, Advanced Drug Information	2
RX526, Pharmacy, Policy and the Law	3
RX523, Clinical Pharmacokinetics	3
Liberal Education Elective	3
RX609-80, Sp Top:Current Topics in Pharm. Sci	1
Total semester hours	17

Fourth Professional Year	Credit Hours
Rotations	40
• 3 Research Rotations** (12 weeks total)—May thru July **(Prerequisite for Research Rotations: Grade of C or better in Research Track Basic Science Courses; All three research rotations are to be completed consecutively)	
• 5 Required Pharmacy Practice Rotations:	
• 2 General Medicine, or Internal Medicine, or Family Practice Rotations	
• 2 Community Pharmacy Rotations	
• 1Ambulatory Care Rotation	
• 2 Elective Pharmacy Practice Rotations	
RX 607, PharmD Senior Seminar I	1
RX 608, PharmD Senior Seminar II	1
Total hours	42

Total Credit Hours Required for Graduation: 212

Doctor of Pharmacy with Medical Spanish Emphasis

Students may formally declare the COPHS Medical Spanish Track either as preprofessional or professional phase pharmacy students. Successful completion of the COPHS Medical Spanish Track requires the completion of a minimum of 12 credit hours of medical Spanish coursework taken as medical Spanish courses having the RX course designator, and the 12 credit hours must include RX692, an APPE rotation with a Spanish-language focus. Students receiving a placement of SP305 or higher on the Spanish language placement test will be awarded three hours of "back credit" for RX615, Introduction to Medical Spanish, upon completion of nine credit hours of COPHS medical Spanish courses. RX617, Advanced Medical Spanish, or permission of the instructor, is a prerequisite for the RX692 APPE rotation. The following courses may be used to satisfy completion of the Medical Spanish Track:

- RX615 Introduction to Medical Spanish (204-level)—3 credit hours
- RX617 Advanced Medical Spanish (300-level)—3 credit hours
- RX619 Medical Spanish Service Learning (300-/400-level)—3 credit hours
- RX611-68 Spanish Language Immersion trip to Mexico (100-300- level)—3 credit hours
- RX692 APPE Rotation—4 credit hours

Doctor of Pharmacy/Master of Science in Pharmaceutical Sciences Degree

One of the factors that limit many doctor of pharmacy students from pursuing advanced degrees is the time commitment of 8-9 years required to complete the Pharm.D. degree plus an advanced pharmaceutical degree. The objective of this program is to provide students a time- and financially-efficient way for students to meet their professional goals. The curriculum for the Pharm.D./M.S. dual degree integrates the existing curricula of the Pharm.D. degree and the M.S. in pharmaceutical sciences degree, allowing students seeking their doctor of pharmacy degree (Pharm.D.) to **simultaneously** complete a master of science (M.S.) degree in pharmaceutical sciences.

The Pharm.D. degree allows students to work in many facets of the practice of pharmacy. Offering a Pharm.D./M.S. dual degree allows doctor of pharmacy students to pursue additional training in the area of pharmaceutical sciences research. Having a Pharm.D./M.S. dual degree will aid in the recruitment and retention of outstanding pharmacy students with a strong interest in research. A Pharm.D./M.S. degree will also make Butler graduates more competitive for positions in the pharmaceutical industry or for academic positions.

Years 1-3 as above

Summer Research following P1 Year

Students will engage in summer research and receive independent study credits (five credits). The intention is to have students get started on their respective projects. The summer research experience will last the entire summer.

Second Professional Year	Credit Hours
RX401, Intro to Pharm Practice Experience	0
RX403, Therapeutics I Case Studies	1
RX411, Prin of Drug Action I	4
RX413, Therapeutics I	3
RX421, Introduction to Dosage Forms	4
RX415, Self-Care and Health Promotion I	2
Liberal Education Elective	3
RX634, Seminars in Pharmaceutical Sci	1
RX 601, Independent study	1
Total semester hours	19

Courses (Spring Semester)	Credit Hours
RX404, Therapeutics II Case Studies	1
RX412, Prin of Drug Action II	4
RX414, Therapeutics II	3
RX416, Self-Care and Health Promotion II	3
RX422, Advanced Dosage Forms	4
RX432, Personnel and Financial Mgmt	3
RX609, Current Topics in Pharm Sci	1
RX601, Independent study	1
Total semester hours	20

Entry into the graduate program
(See Graduate Studies, p. 330)
Summer Research following P2 year
RX 705/706 Research and Thesis 3

Third Professional Year	Credit Hours
RX501, IPPE	0
RX503, Therapeutics III Case Studies	1
RX511, Prin of Drug Action III	4
RX513, Therapeutics III	3
RX522, PK and Biopharmaceutics	3
RX713, Biostatistics and Research Design	3
Graduate level elective	3
RX781, Seminars in Pharmaceutical Sci	1
RX783, Intro pharmaceutical research	2
Total semester hours	20

Courses (Spring Semester)	Credit Hours
RX500, Intro Experiential Rotations	1
RX504, Therapeutics IV Case Studies	1
RX514, Therapeutics IV	3
RX523, Clinical Pharmacokinetics	3
RX526, Pharmacy, Policy and the Law	3
RX528, Advanced Drug Information and Literature Evaluation	2
Graduate level elective	3
RX701, Research and Thesis	1
RX785, Biopharmaceutical analysis	3
Total semester hours	20

Fourth Professional Year	Credit Hours
3 graduate level Research Rotations	12
7 Required Rotations:	28
2 General Medicine, or Internal Medicine, or Family Practice Rotations	
1 Community Pharmacy Rotation	
1 Ambulatory Care Rotation	
3 Patient Care Elective Rotations (1 of 3 rotations must be in an acute setting)	
RX607, PharmD Senior Seminar I	1
RX608, PharmD Senior Seminar I	1
RX782, Ethics in Research	1
RX780, Current Topics	1
Total Semester Hours	44

Completed Thesis to be submitted May of graduating year.
Total credit hours required for graduation: 232

Master of Science in Pharmaceutical Sciences Degree

The College of Pharmacy and Health Sciences offers the master of science in pharmaceutical sciences in five areas of emphasis: pharmaceutics, pharmacology, medicinal chemistry, pharmacy administration, and clinical sciences. The program involves an intensive curriculum consisting of didactic courses and thesis research. Successful completion of the M.S. in pharmaceutical sciences degree requires successful completion of at least 30 semester credit hours with not less than six hours of research credit. The research must be compiled into a thesis, which is presented and defended in front of the committee. Details of the program are available under the graduate studies section on page 330.

Master of Physician Assistant Studies

The College of Pharmacy and Health Sciences offers a master of physician assistant studies (M.P.A.S.) degree for those completing the requirements of the physician assistant (PA) program. PAs practice medicine under the supervision of licensed physicians, providing patient care services that would otherwise be done by physicians. PAs perform a wide range of medical duties including obtaining medical histories, performing physical examinations, developing/implementing comprehensive diagnostic and patient management plans, providing patient education and counseling, ordering and interpreting diagnostic tests, performing therapeutic procedures, and prescribing medications. PAs practice in a variety of settings and specialties, with their specific practice activities guided by the specialty of the supervising physician and the setting of the practice.

The physician assistant program requires completion of a two-year preprofessional curriculum and a three-year professional curriculum. The preprofessional curriculum, in addition to including the Butler core curriculum requirements, emphasizes college-level preparation in mathematics and life sciences. The professional phase, which begins with the third year, consists of a two-year preclinical component and a 12-month

clinical component. During the preclinical phase, students receive instruction in anatomy, physiology, pathology, social and professional issues related to medical practice, techniques of history-taking and physical assessment, clinical medicine, pharmacology, therapeutics, medical procedures, and research methods. The instruction is supplemented by laboratory experiences to enable students to practice what they have learned. The clinical component consists of rotations in major medical disciplines, with emphasis on primary care. Students have the option of taking electives in medical and/or surgical specialties, or continuing to gain additional primary care experience.

Physician Assistant Program Student Learning Outcomes

- Demonstrate core knowledge about established and evolving biomedical and clinical sciences and the application of knowledge to patient care.
- Assess, evaluate and improve patient care practices.
- Interpret and respond to the larger system of health care to provide patient care that is of optimal value.
- Use investigatory and analytic thinking approaches to clinical situations.
- Display interpersonal and communication skills that result in effective information exchange with patients, patients' families, physicians, professional associates, and the health care system.
- Show care that is effective, patient-centered, timely, efficient, and equitable for the treatment of health problems and the promotion of wellness.
- Display a high level of responsibility and sensitivity to a diverse patient population.
- Conform to high standards of ethical practice and to legal/regulatory requirements.

Eligibility and Admission Requirements

There are three pathways by which candidates can gain admission into the physician assistant program. The details of these pathways are outlined below.

Pathway 1: Automatic Advancement Process

Admission into Pre-Health Science/Pre-PA program

To be admitted to the auto-advance, pre-health science (i.e., pre-PA) program as freshmen at Butler University, students will be required to meet the auto-advancement entrance criteria of the College of Pharmacy and Health Sciences with regard to GPA and standardized test scores. The number of students admitted as auto-advance, pre-PA students will be limited to approximately 30 per year, and offers of admission will be made on a competitive basis. It is recommended that applications be submitted as early as possible in the admission cycle.

Admission into PA Program

Auto-advance, pre-PA students will be automatically advanced (offered admission) into the PA1 year of the PA Program upon completion of their second, fall semester of Butler enrollment (not including summer sessions) if the requirements for automatic advancement are met:

1. Cumulative GPA at Butler University of at least 3.0.
2. No grade less than C in any course used to satisfy the requirements of the pre-physician assistant curriculum.
3. No withdrawal from or repeat of any course used to satisfy the requirements of the pre-physician assistant curriculum.
4. Cumulative GPA (i.e. science GPA) equal to or greater than 3.0 in the following courses: CH105, CH106, BI105, CH351, PH107, PX311.
5. No conduct code violations.

Students are required to be enrolled full-time during the regular (i.e. fall and spring) semesters and must complete all prerequisite courses by the conclusion of the second spring semester of enrollment while maintaining compliance with the above requirements.

The credit from no more than two transfer or AP courses may be substituted for any of the courses listed in the pre-physician assistant (pre-PA) curriculum (see table below). The official Butler GPA is not affected by the grades earned from transfer courses or associated with AP credit. However, transfer courses and/

or AP credit will affect the cumulative Butler GPA and science GPAs upon which eligibility determinations for auto-advancement will be based according to the following guidelines: grades from accepted transfer courses will be included in GPA calculations according to the scale in the Butler University Student Handbook, and an "A" (4.0 score) will be awarded for each course from which AP credit was earned and accepted.

Any student who fails to meet any of the above criteria will be dismissed from the automatic advancement process, but may be eligible to apply for admission through either of the other two pathways described below.

Eligibility for automatic advancement into the PA1 year of the PA program ceases after the student's initial review for professional phase admission at the end of their second fall semester at Butler University.

First Year (Pre-Physician Assistant Curriculum, PrePA-1):

	COURSES (FALL SEMESTER)	SEM HRS		COURSES (SPRING SEMESTER)	SEM HRS
FYS101	First Year Seminar-1	3	FYS102	First Year Seminar-2	3
CH105	General Chemistry (with lab)	5	CH106	General Chemistry (with lab)	5
BI105	Introductory Cell Biology	3	—	Core (AR, PCA, SW, TI)	3
—	Core (AR, PCA, SW, TI)	3	—	Core (AR, PCA, SW, TI)	3
PWB	Physical Well Being	1		BCR	
	Butler Cultural Requirement (BCR)			Indianapolis Community Requirement	
	Total semester hours	**15**		**Total semester hours**	**14**

Second Year (Pre-Physician Assistant Curriculum, PrePA-2):

	COURSES (FALL SEMESTER)	SEM HRS		COURSES (SPRING SEMESTER)	SEM HRS
GHS	Global and Historical Studies	3	GHS	Global and Historical Studies (Different from fall course)	3
CH351	Organic Chemistry-I (with lab)	5	CH352	Organic Chemistry-II (with lab)	5
PH107	Physics-I (with lab)	4	BI325	Pathogenic Microbiology (with lab)	3
—	Core (AR, PCA, SW, TI)	3	—	Elective Liberal Education Course/s	3
PX311	Human Anatomy	3	PX315	Human Physiology	4
	BCR			BCR	
	Total semester hours	**18**		**Total semester hours**	**14**

General Information Regarding Pathways 2 and 3

Pathways 2 or 3 are the processes all non-auto-advance students interested in applying to the PA program must follow. Non-auto-advance applicants will be classified as belonging to one of two categories: Butler and non-Butler. Butler applicants are those who have been or are currently enrolled at Butler University AND have completed less than 12 hours of credit (excluding AP or IB credits) at institutions of higher learning other than Butler University. Non-Butler applicants are those who have earned 12 or more hours of credit (excluding AP or IB credits) at institutions of higher learning other than Butler University.

Applications for the PA Program must be submitted through an electronic application processing service (CASPA). CASPA is a service of the Physician Assistant Education Association (PAEA) and offers applicants a convenient, Web-based application service that allows application to participating PA educational programs by completing a single application. The online application was specifically designed for ease and convenience. With far less paperwork, streamlined processing, and ongoing communication with applicants, CASPA offers the ability to apply to multiple programs across the country.

Pathways 2 and 3 are competitive. Thus, it is important that applications be submitted as soon as possible once the application cycle opens (generally mid-April). It is also important that applicants clearly indicate on the CASPA application classes completed, those currently being completed and those expected to be completed by May 31 of the year in which the applicant wishes to matriculate into the PA Program.

Non-Butler applicants who have completed 12 hours or greater of credit (excluding AP or IB credits) outside of Butler University by the time of the submission of their completed application to CASPA are required to include GRE scores (School Code: 1073) at the time of application. These same applicants are required to earn a BS/BA degree or higher by May 31 of the year of intended matriculation into the PA program. Butler applicants will not be required to earn a BS/BA degree by May 31 and will not be required to include GRE scores providing they identify themselves as a "Non-Auto-Advance, Butler Applicant" in an e-mail to Dr. John Lucich at jlucich@butler.edu by Oct. 1 (for Pathway 2 applicants) or by Nov. 15 for Pathway 3 applicants.

The majority of communication regarding invitations to interview, offers of admission, etc. will be conducted by e-mail, so it is very important that the PA Program (via CASPA) has an accurate e-mail address for all applicants and that applicants check their e-mail accounts on a daily basis. Generally, responses to program requests must be accomplished within three days or less. Failure to promptly respond to requests may result in loss of eligibility for admission.

The criteria for admission and the policies that guide the admission process have been carefully developed and empirically derived. As such, few if any requests for exemptions from the criteria/policies are granted. However, should an applicant feel that his/her circumstances warrant special consideration, the applicant may forward an appeal in writing (via e-mail) to the chair of the admissions committee, Dr. John Lucich at jlucich@butler.edu. To be considered, the appeal e-mail must include "Appeal Request" in the subject line, state the policy/criteria for which an exemption is being requested, and provide a detailed rationale for the request.

General questions regarding the admissions process should be directed to Mary Kay Liverett at 317-940-6529 or mliveret@butler.edu.

Pathway 2: Early Decision Process

The minimum eligibility requirements for admission via Pathway 2 are:

1. A cumulative GPA from all institutions of higher learning of at least a 3.5 as calculated per CASPA protocol.
2. The submission of a completed application to CASPA by Sept. 1 and verification of that application by CASPA by Oct. 15 of the year prior to the year of desired enrollment into the PA Program.* It is the applicant's responsibility to monitor and ensure adherence to these deadlines. The applicant's credentials will be assessed according to the information in the application at the time it was verified by CASPA. As such updates to GPAs, GRE scores etc. will not be considered within an application cycle.
3. The ability to provide evidence of successful completion of the math/science prerequisites (listed below) or their transfer equivalents with a grade of C- or better by May 31 prior to matriculation into the PA Program. See Curriculum for details. Non-auto-advance Butler applicants without a BS/BA degree must also earn C- or above in ALL other courses used to satisfy the requirements of the pre-physician assistant curriculum prior to matriculation into the PA program.
4. Receipt by Butler University of a deposit by Feb. 1 (if offered admission).

*Be advised that for an application to be deemed "completed," it must be

accompanied by college transcripts, letters of recommendation, GRE scores, and any other documents required for processing by CASPA.

Required Math/Science Prerequisite Courses* for Pathway 2 Applicants
General Biology [cell] (BI105)
General Chemistry with lab (CH105)
General Chemistry II with lab (CH106)
Organic Chemistry with lab (CH351)
Organic Chemistry II with lab (CH352)
Microbiology (BI325)
General math course (above algebra)
Physics (PH107)
Human Anatomy (PX311)
Human Physiology (PX315)
*Equivalent transfer courses are also acceptable.

Applicants satisfying the above criteria are eligible to be ranked and considered for invitation to a "non-academic evaluation" (NAE). The composition of an NAE will typically include one or more interviews, an opportunity to meet current students, various information sessions, and any other activities deemed desirable by the PA Admissions Committee. Invitations for the NAE will generally be issued to the most highly ranked Pathway 2 candidates near the first of November and the NAE will generally be conducted on or about the second Saturday of November. The NAE scores and other behavioral assessments of applicants will be used by the PA Admissions Committee to adjust the pre-NAE rankings of candidates and will inform decisions regarding which applicants will receive offers of admission and which will be wait-listed. These decisions will generally be communicated via e-mail to applicants within 10 to 15 days of completion of the NAE.

Pathway 3: Standard Decision Process

The minimum eligibility requirements for admission via Pathway 3 are:

1. A cumulative GPA from all institutions of higher learning of at least 3.2 as calculated per CASPA protocol.
2. The submission of a completed application to CASPA by Dec. 1 of the year prior to the year of desired enrollment into the PA Program and verification of that application by CASPA by Jan. 15 of the year of desired enrollment into the PA Program.* It is the applicant's responsibility to monitor and ensure adherence to these deadlines. The applicant's credentials will be assessed according to the information in the application at the time it was verified by CASPA. As such updates to GPAs, GRE scores etc. will not be considered within an application cycle.
3. The ability to provide evidence of successful completion of the math/science prerequisites (listed below) or their transfer equivalents with a grade of C- or better by May 31 prior to matriculation into the PA Program. See Curriculum for details. Non-auto-advance Butler applicants without a B.S./B.A. degree must also earn C- or above in ALL other courses used to satisfy the requirements of the pre-physician assistant curriculum prior to matriculation into the PA program.
4. Receipt by Butler University of a deposit by May 1 (if offered admission).

* Be advised that for an application to be deemed "completed," it must be accompanied by college transcripts, letters of recommendation, GRE scores, and any other documents required for processing by CASPA.

Required Math/Science Prerequisite Courses* for Pathway 3 Applicants
General Biology [cell] (BI105)
General Chemistry with lab (CH105)
General Chemistry II with lab (CH106)
Organic Chemistry with lab (CH351)
Organic Chemistry II with lab (CH352)
Microbiology (BI325)
General math course (above algebra)
Physics (PH107)
Human Anatomy (PX311)
Human Physiology (PX315)
*Equivalent transfer courses are also acceptable.

Applicants satisfying the above criteria are eligible to be ranked and considered for invitation to a "non-academic evaluation" (NAE). The composition of an NAE will typically include one or more interviews, an opportunity to meet current students, various information sessions, and any other activities deemed desirable by the PA Admissions Committee. Invitations for the NAE will generally be issued to the most highly ranked Pathway 3 candidates near the first of February,

and the NAE will generally be conducted on or about the second Saturday of February. The NAE scores and other behavioral assessments of applicants will be used by the PA Admissions Committee to adjust the pre-NAE rankings of candidates and will inform decisions regarding which applicants will receive offers of admission and which will be wait-listed. These decisions will generally be communicated via e-mail to applicants within 10 to 15 days of completion of the NAE.

Requirements and deadlines for Pathways 1, 2 and 3 are subject to change. Should a change occur, it will be posted on the COPHS website and the PA program will make every effort to communicate the change as soon as possible to all those in the application pipeline for whom email addresses are available.

Degree Requirements

Students are required to complete 192 semester hours with a comprehensive Butler GPA of 2.0 or greater in all courses to be awarded the master of physician assistant studies degree. All students who complete the first four years of the curriculum will be awarded the bachelor of science in health sciences degree.

Successful completion of the professional curriculum requires that the student not exceed five credit hours of coursework with earned grades less than C (2.0) in PX and AP courses numbered 300 or higher. Additionally, the student's professional GPA must be 2.0 or higher. For the purposes of this calculation, the professional curriculum consists of those courses designated AP or PX. The proper sequence of courses must be maintained in the professional phase. The student is responsible for making certain that he or she has completed all required courses in the curriculum.

The curriculum of the PA program should be viewed as being offered in three sections (PA1, PA2 and PA3 years) that are individually indivisible and to be taken in an uninterrupted sequence over three years. Therefore, it is expected that students first matriculated into the PA1 year will maintain simultaneous enrollment in all professional courses offered as a component of each year's curriculum. Students may not progress to the professional coursework in the next year of the program until they have successfully completed all professional courses within the current year. Professional phase PA students must earn a grade of C or better in all courses within the professional phase for the courses to be considered successfully completed. PA students may be dismissed from the college following failure of any two professional phase (AP-designated) courses, in addition to not adhering to the policies listed in the COPHS Student Handbook.

Any student who is absent from clinical rotations for three months or more must perform an observed history and physical examination on a real or simulated patient. A history and physical examination is a combined assessment and is graded as such. The student must score a 70 percent or better on each of these assessments before being allowed to return to clinical rotations. The student will have two opportunities, evenly spaced over a two-month period of time, to pass each of these assessments. If unsuccessful, the student will be dismissed from the college.

Physician Assistant Curriculum — Master of Physician Assistant Studies

The program reserves the right to change the curriculum at the discretion of the faculty.

First Year (Pre-Physician Assistant Curriculum):

Courses (Fall Semester)	**Credit Hours**
FYS101, Freshman Year Seminar	3
CH105, General Chemistry (with lab)	5
BI105, Introductory Cell Biology	3
Core (TI, PCA, SW or AR)* **	3
PWB, Physical Well Being	1
Total semester hours	15

Courses (Spring Semester)	**Credit Hours**
FYS102, Freshman Year Seminar	3
CH106, General Chemistry (with lab)	5
Core (TI, PCA, SW or AR)* **	3
Core (TI, PCA, SW or AR)* **	3
Total semester hours	16

Second Year (Pre-Physician Assistant Curriculum):

Courses (Fall Semester)	**Credit Hours**
GHS, Global and Historical Studies	3
CH351, Organic Chemistry I (with lab)	5
PH107, Physics I (with lab)	4
Core (TI, PCA, SW or AR)* **	3
PX311, Human Anatomy	3
Total semester hours	18

Courses (Spring Semester)	Credit Hours
GHS, Global and Historical Studies	3
CH352, Organic Chemistry II (with lab)	5
BI325, Pathogenic Micro (with lab)	3
Elective Liberal Education Course	3
PX315, Human Physiology	4
Total semester hours	18

*TI = Text and Ideas, PCA = Perspectives in the Creative Arts., SW = The Social World, AR = Analytical Reasoning
**Students (except previously degreed) must take at least one core course in each of the divisions listed. In addition, students are required to complete the speaking across the curriculum, writing across the curriculum, Indianapolis Community Requirements, and cultural requirements for the core.

Third Year: (Physician Assistant Curriculum):

Courses (Fall Semester)	Credit hours
AP301, Physiology	5
AP307, Pathophysiology I	5
AP308, Pharmacology I	3
AP313, Social and Behavioral Medicine	3
AP350, Clinical Quality Improvement I	3
Total semester hours	19

Courses (Spring Semester)	Credit Hours
AP302, Anatomy	4
AP309, Pathophysiology II	4
AP310, Pharmacology II	3
AP314, Issues in Professional Practice I	2
AP351, Clinical Quality Improvement II	3
Total semester hours	16

Fourth Year: (Physician Assistant Curriculum):

Courses (Fall Semester)	Credit hours
AP402, Healthcare Communications I	1
AP404, Hist and Phys Assessment I	3
AP406, Diag and Ther Procedures I	3
AP408, Clinical Integration I	1
AP410, EKG Interpretation	1
AP413, Therapeutics I	4
AP421, Clinical Medicine I	6
Total semester hours	19

Courses (Spring Semester)	Credit Hours
AP403, Healthcare Communications II	1
AP405, Hist and Phys Assessment II	3AP409,
Clinical Integration II	1
AP414, Therapeutics II	5
AP417, Diag and Ther Procedures II	3
AP422, Clinical Medicine II	6
Total semester hours	19

Fifth Year: (Physician Assistant Curriculum):

Courses (Summer 1)	Credit Hours
AP540, Family Practice Rotation	6
AP587, Core Content I	1
Total semester hours	7

Courses (Summer 2)	Credit Hours
AP541, Internal Medicine Rotation	6
AP588, Core Content II	1
Total semester hours	7

Fifth Year: (Physician Assistant Curriculum):

Courses (Fall Semester)	Credit Hours
AP524, OB/GYN Rotation	6
AP546, Surgery Rotation	6
AP5--, Elective Rotation	4
AP589, Core Content III	1
AP525, Issues in Professional Practice II	1
Total semester hours	18

Courses (Spring Semester)	Credit Hours
AP542, Pediatrics Rotation	6
AP543, Comm Mental Health Rotation	6
AP590, Core Content IV	2
AP545, Emergency Medicine Rotation	6
Total semester hours	20

Total Hours—192

The above clinical rotation schedule is just one of several possible sequences. The clinical coordinator will determine individual student rotation schedules. All rotations are assigned within a designated radius of Butler University. Students are responsible for providing their own transportation.

Pre-Professional Health Sciences Courses

PX100, Health Sciences Seminar: The purpose of the course is to get students involved early with the college and their major and to develop success skills that are applicable to all future learning experiences. Emphasis is placed on use of campus resources, developing communication skills, and examining career choices and options. Requisite: This course is required of all COPHS students without a previous degree. Open to COPHS students only. (U)(1). Fall.

PX200, Introduction to Professional Practice: This course is designed to develop and enhance patient communication skills, professional attitudes, and independent learning. The course brings awareness of socioeconomic and cultural diversity and how it affects health outcomes. (U)(1). Fall and spring.

PX210, Topics in Health and Wellness: This course will provide an in-depth exploration of key health related topics of particular importance to college-age individuals. Topics covered in this class include nutrition, exercise, alcohol, infectious diseases, drug use/misuse, over-the-counter medications and supplements, personal safety, and chronic disease prevention. This class is designed for freshmen and sophomore students. (U)(3). Fall.

PX311, Human Anatomy: This course discusses human anatomical composition and organization from the level of the atom to the level of the organism. Those aspects of anatomy required for the clinical education and practice are emphasized. Prerequisite: BI105 or 122, or BI100 for non-COPHS students. (U)(3). Fall.

PX315, Human Physiology for the Health Sciences: A study of the functions of the human body emphasizing the actions and regulation of the specific organs and organ systems, and how their performance is integrated in achieving homeostasis. Prerequisites: Human anatomy and organic chemistry, both with passing grades. (U)(4). Spring.

PX325, Ethical Issues in Health Care: This course will provide students with an awareness of current ethics issues in health care and an appreciation of the gravity of these issues. The associated body of knowledge will be discussed, and students will formally devise their own ethical position. Open to COPHS pre-pharmacy and pharmacy students only or by permission of the instructor. (U)(3). Fall and spring.

PX334, Human Anatomy and Physiology I: A two semester lecture and laboratory course designed for preprofessional health students. This course begins with basic concepts and progresses through the organ systems with emphasis placed on those aspects of human anatomy and physiology that are most important to an understanding of homeostasis, pathophysiology, and disease. Sophomore standing or permission. (U)(5). Fall.

PX335, Human Anatomy and Physiology II: A two-semester lecture and laboratory course designed for preprofessional health students. This course begins with basic concepts and progresses through the organ systems with emphasis placed on those aspects of human anatomy and physiology that are most important to an understanding of homeostasis, pathophysiology, and disease. Sophomore standing or permission. (U)(5). Spring.

PX340, Public Health: Law & Policy: Familiarize students with the legal and policy issues involved in public health. The United States has many pressing public health issues. Students will be exposed to major public health challenges and explore the laws that surround public health issues; and understand how to balance public needs versus individual private rights. Prerequisite: Junior standing. (2)(U). Spring.

Physician Assistant (PA) Courses

AP301, Physiology for PAs: This course emphasizes those aspects of human anatomy and physiology that are most important to an understanding of pathophysiology, physical diagnosis of disease, interpretation of patient clinical assessment, and treatment of disease. Prerequisites: First professional year standing in the PA program. (U)(5). Fall.

AP302, Anatomy for PAs: This course emphasizes those aspects of human anatomy that are most important to an understanding of pathophysiology, physical diagnosis of disease, interpretation of patient clinical assessment, and treatment of disease. Prerequisites: Grade of C or better in AP301. (U)(4). Spring.

AP307, Pathophysiology I: This course will emphasize normal structure/ function of human organ systems and the physiology of disease, of disordered function, or derangement of function seen in human disease. Prerequisite: First professional year standing in the PA program. (U)(5). Fall.

AP308, Pharmacology II: This course provides an introduction to the principles of drug absorption, distribution, metabolism, and excretion. In addition, the course includes a study of the mechanisms underlying the therapeutic and adverse effects of drugs used to treat human disease. Prerequisite: First professional year standing in the PA program. (U)(3). Fall.

AP309, Pathophysiology II: This course is a continuation of AP307, Pathophysiology I. Prerequisite: Grade of C or better in AP307. (U)(4). Spring.

AP310, Pharmacology II: This course is a continuation of AP308, Pharmacology I. Prerequisite: Grade of C or better in AP308. (U)(3). Spring.

AP313, Social and Behavioral Medicine: Introduction in the basic counseling skills necessary to help patients cope with illness and injury, follow prescribed treatment regimens, and modify patients' attitudes and behaviors to more healthful patterns. This includes a functional understanding of personality development, normative responses to stress, psychosomatic manifestations of illness and injury, sexuality, responses to death and dying, and behavioral patterns related to the maintenance and restoration of health. Prerequisite: Professional phase status in the Physician Assistant Program. (U)(3) Fall.

AP314, Issues in Professional Practice I: A course designed to introduce PA students to past, current, and emerging health care delivery systems and methods of financing health care. Also explored are issues confronting practicing professionals such as ethics, quality/risk management, end-of-life decisions, and professional liability. Prerequisite: Professional phase in the Physician Assistant Program. (U)(2). Spring.

AP350, Clinical Quality Improvement I: This course is part one of a two-part series designed to prepare the physician assistant student to apply the concepts of research design and statistical analysis within the clinical environment. Research skills developed in this course will emphasize a systematic and scientific approach to problem solving. The course will focus primarily on clinical quality improvement designs and analysis. The class will provide an overview of the various steps of the clinical research process such as problem formulation, hypothesis generation, study design, measurement, data collection, and analysis. Additionally, there will be a focus on statistical concepts. Prerequisite: Acceptance into the professional phase of the PA Program. (U)(3). Fall.

AP351, Clinical Quality Improvement II: This course is part two of a two-part series designed to prepare the physician assistant student to apply the concepts of research design and statistical analysis within the clinical environment. Research skills developed in this course emphasize a systematic and scientific approach to problem solving. The course will focus primarily on clinical quality improvement designs and analysis with special attention on evidence based medicine commonly used in clinical quality improvement students. Prerequisite: Acceptance into the professional phase of the PA Program (U)(3). Spring.

AP402, Healthcare Communication I: Prepares the physician assistant student to communicate within the healthcare setting. Prerequisite: Acceptance into the professional phase of the PA Program. (U)(1).

AP403, Healthcare Communications II: Prepares the physician assistant student to communicate within the healthcare setting, a continuation of AP402. Prerequisite: Acceptance into the professional phase of the PA Program. (U)(1).

AP404, History and Physical Assessment I: Prepares the physician assistant to do a complete history and physical examination. Prerequisite: PA fourth year standing and acceptance into the professional phase of the PA Program. (U)(3). Fall.

AP405, History and Physical Assessment II: Prepares the physician assistant to do a complete history and physical examination as a continuation of AP404. Prerequisite: Acceptance into the professional phase of the PA Program. (U)(4). Spring.

AP406, Diagnostic and Therapeutic Procedures 1: This course will introduce the student to clinical skills of both diagnostic and therapeutic value in order to screen for, prevent, and treat disease entities. Prerequisite: Fourth-year standing in the Physician Assistant Program. (U)(3). Fall.

AP408, Clinical Integration I: This course provides students with an opportunity to manage virtual patients by applying the knowledge, skills, and attitudes developed in other professional physician assistant coursework. (U)(1). Fall.

AP409, Clinical Integration II: A continuation of Clinical Integration I. (P/F). (U)(1). Spring.

AP410, EKG Interpretation: This course provides students with instruction in

interpreting 12-lead electrocardiograms for heart rate, rhythm, conduction system blocks, electrical axis, hypertrophy, ischemia, injury, infarction, and miscellaneous drug, electrolyte, disease, and pacemaker effects. Prerequisite: Fourth-year standing in the Physician Assistant Program. (U)(1). Fall.

AP413, Therapeutics for the Physician Assistant I: This course prepares the physician assistant to manage drug therapy for patients in certain health care settings. Prerequisite: Fourth-year standing in the PA program and co-requisites of AP421 or permission of instructor. (U)(4). Fall.

AP414, Therapeutics for the Physician Assistant II: A continuation of AP413. This course prepares the physician assistant to manage drug therapy for patients in certain health care settings. Prerequisite: AP413 Therapeutics for PA1, AP421 Clinical Medicine for PA1, AP406 Diagnostic and Therapeutic Procedures. Co requisite: AP423 Clinical Medicine for PA2 or permission of instructor. (U)(5). Spring.

AP417, Diagnostic and Therapeutic Procedures II: A continuation of AP406, Diagnostic and Therapeutic Procedures 1. This course will introduce the student to clinical skills of both diagnostic and therapeutic value in order to screen for, prevent, and treat disease entities. Prerequisite: Fourth-year standing in the Physician Assistant Program. (U)(3). Spring.

AP421, Clinical Medicine for PAs I: The intricacies of human disease are taught through a systems approach. Each unit begins with a review of related anatomy and physiology followed by a discussion of pathophysiology signs and symptoms, diagnostic methods, and management. Prerequisite: Fourth year standing. (U)(6). Fall.

AP422, Clinical Medicine for PAs II: A continuation of AP421. Prerequisites: AP421 Clinical Medicine for PAs I, AP406 Diagnostic and Therapeutic Procedures, AP413 Therapeutics for PAs I. (U)(5). Spring.

AP501, Physician Assistant Project: Students will demonstrate core knowledge about one or more of the following: the physician assistant profession, established or evolving biomedical or clinical sciences, or the application of this knowledge. Students will have an opportunity to conduct research or develop a clinically-related project. Prerequisite: Enrollment in the Physician Assistant Program. (G)(1). Fall, spring, and summer.

AP502, Physician Assistant Project Presentation: Students will complete the research/clinical project begun in AP501 and display communication skills that result in effective information exchange with one or more of the following groups: patients, patients' families, physicians, professional associates, faculty, and/or the health care system. Prerequisites: Enrollment in the Physician Assistant Program. (G)(2). Fall, spring, and summer.

AP525, Issues in Professional Practice II: A continuation of Issues in Professional Practice I. Prerequisite: Fifth-year standing in the Physician Assistant Program. (G)(1). Fall.

AP533, General Elective Rotation (4): This is a one-month rotation where students have the opportunity to gain supervised experience in specialized areas of medical practice. Alternatively, the student may elect to gain additional experience in a primary care setting. Prerequisites: Fifth year standing. (G)(4). Annually, term varies.

AP540, Family Practice Rotation (6): This is a six-week rotation in a family practice setting where students provide supervised care for patients ranging in age from newborns to the elderly. Patient care activities include eliciting histories, performing physicals, ordering/performing diagnostic tests, and formulating management plans. Prerequisite: Fifth year standing. (G)(6). Annually, term varies.

AP541, Internal Medicine Rotation (6): This is a six-week rotation designed to expose students to the indications, limitations, and methods of performing diagnostic and therapeutic measures used in the treatment of general medical disorders. Students will perform patient care activities in a supervised clinical setting. Prerequisite: Fifth year standing. (G)(6). Annually, term varies.

AP542, Pediatric Rotation (6): This is a six-week rotation in a pediatric setting where students provide supervised care for newborns,

infants, children, and adolescents. Patient care activities center around assessing normal growth and development, and diagnosing and formulating management plans for conditions commonly encountered in the pediatric population. Prerequisite: Fifth year standing. (G)(6). Annually, term varies.

AP543, Community Mental Health Rotation (6): This is a six-week rotation in a mental health setting where students provide supervised care of patients being treated for minor psychiatric diseases and mental stresses. Patient care activities center on proper data collection, problem recognition, counseling techniques, and use of referral mechanisms. Prerequisite: Fifth year standing. (G)(6). Annually, term varies.

AP544, Obstetrics/Gynecology Rotation (6): This is a six-week rotation in an obstetrics/gynecology practice, where students provide supervised care for women. Patient care activities center around assessing the reproductive system in pregnant and non-pregnant states, and formulating management plans for conditions commonly encountered in an obstetrics/gynecology practice. Prerequisites: Fifth year standing. (G)(6). Annually, term varies.

AP545, Emergency Medicine Rotation (6): This is a six-week rotation in a hospital emergency department where students provide care for patients with conditions ranging from non-urgent medical problems to major trauma and critical illness. Emphasis is on etiology, evaluation, and initial treatment of common medical and surgical conditions. Prerequisite: Fifth year standing. (G)(6). Annually, term varies.

AP546, General Surgery Rotation (6): This is a six-week rotation in a hospital setting where students provide supervised care of patients in all ages with general surgical problems. Emphasis is on principles and concepts of surgery and surgical care as they relate to problems encountered in primary care settings. Prerequisite: Fifth year standing. (G)(6). Annually, term varies.

AP587, Core Content I: This self-study course allows the student to practice and demonstrate the ability to perform independent learning regarding the principles of medical care within the scope of physician assistant practice. This course is especially designed to: 1) help guide and encourage the student's systematic preparation for the Physician Assistant National Certification Examination (PANCE) by means of monthly examinations; and 2) develop and assess the student's competency in each of the stated "Terminal Outcomes" of the P.A. Program (linked to suitability for clinical practice) via a combination of case presentations and the summative evaluation. Prerequisites: Fifth year standing within the PA program. (G)(1). Summer.

AP588, Core Content II: This self-study course allows the student to practice and demonstrate the ability to perform independent learning regarding the principles of medical care within the scope of physician assistant practice. This course is especially designed to: 1) help guide and encourage the student's systematic preparation for the Physician Assistant National Certification Examination (PANCE) by means of monthly examinations; and 2) develop and assess the student's competency in each of the stated "Terminal Outcomes" of the P.A. Program (linked to suitability for clinical practice) via a combination of case presentations and the summative evaluation. Prerequisites: Fifth year standing. (G)(1). Summer.

AP589, Core Content III: This self-study course allows the student to practice and demonstrate the ability to perform independent learning regarding the principles of medical care within the scope of physician assistant practice. This course is especially designed to: 1) help guide and encourage the student's systematic preparation for the Physician Assistant National Certification Examination (PANCE) by means of monthly examinations; and 2) develop and assess the students competency in each of the stated "Terminal Outcomes" of the P.A. Program (linked to suitability for clinical practice) via a combination of case presentations and the summative evaluation. Prerequisites: Fifth year standing. (G)(1). Annually, term varies.

AP590, Core Content IV: This self-study course allows the student to practice and demonstrate the ability to perform independent learning regarding the principles of medical care within the scope of physician assistant practice.

This course is especially designed to: 1) help guide and encourage the student's systematic preparation for the Physician Assistant National Certification Examination (PANCE) by means of monthly examinations; and 2) develop and assess the student's competency in each of the stated "Terminal Outcomes" of the P.A. Program (linked to suitability for clinical practice) via a combination of case presentations and the summative evaluation. Prerequisites: Fifth year standing. (G)(2). Spring.

Core Courses offered by Pharmacy

SW261S-RX, Health Disparities: This course will allow undergraduate students to examine current population-level health issues and the unequal distribution of health through an introduction to the broad and exciting field of public health and health equity. The course will explore the varying historical, environmental, social, cultural, and political determinants of the health of the people of the United States, emphasizing health of vulnerable populations. It will provide students with a unique opportunity to think critically about ways of identifying and addressing current health issues and the unequal distribution of health status throughout the population. In this interactive course, students are encouraged to explore public health issues in their area of study and examine solutions for the same. (U)(3). Annually, term varies.

TI 262S, Self and Service: In this course, students will read texts that explore the self and the concept of service. Readings will examine the world of children and senior citizens. Sample authors include: Alexie, Updike, and Junot Diaz. Students will create oral and written histories of themselves and a person (child or senior) they serve. This 3 credit hour course is designated service learning (at least 20 hours service required) with a child or senior. (U)(3). Fall.

Pharmacy Courses

RX301, Introductory Pharmacy Practice Experience I: This is a seminar course which prepares pharmacy students for entrance into advanced rotations. Topics will vary according to section and may include professionalism, HIPPA, Indiana pharmacist intern registration, criminal background check, and ACPE graduation requirements. (U)(0). (P/F). Fall.

RX312, Clinical Biochemistry and Metabolism: The application of biochemistry to an understanding of the pathogenesis of disease and treatment including the interpretation of clinical laboratory tests. Prerequisites: CH351 and CH352 with passing grades. (U)(4). Fall.

RX314, Pharmaceutical Biotechnology: A course exploring the application of biochemical and biotechnical methods in the treatment of human disease. Topics introduced include gene expression, recombinant DNA techniques, molecular immunology, protein pharmaceuticals, peptidomimetics, antisense oligonucleotide therapies, and gene therapies. Prerequisites: Clinical Biochemistry, Human Physiology, and Microbiology. (U)(3). Spring.

RX316, Pathophysiology: A study of the pathophysiologic processes underlying selected disease states with emphasis on the alteration of normal physiologic processes caused by and contributing to their condition. Diseases are selected based on their frequency, urgency, and value as a model. Prerequisites: Human Physiology and Microbiology. Prerequisite or corequisite: Clinical Biochemistry. (U)(4). Fall.

RX318, Intro to Principles of Drug Action: The course develops the concepts of how drugs produce their effects on cells and dose-effect and time-effect relationships. The chemistry and pharmacology of drugs that affect the autonomic nervous system are discussed. Prerequisites: RX312 Clinical Biochemistry, RX316 Pathophysiology. (U)(5). Spring.

RX320, Delivery of Health Care: This is a seminar course designed to introduce students to multiple aspects of health care delivery. The purpose of this class is to understand terminology associated with delivery of health care, discuss current trends/events in health care, and identify resources to allow students to track, evaluate, and respond to the health care environment as future practitioners. (U)(3). Spring.

RX324, Clinical Assessment: Methods of physical assessment and interviewing skills are presented. Normal anatomical, physiological, and pathophysiological processes of the human body are presented. With case illustrations, students learn selected diseases and the interrelationship between patient interview,

abnormal physical and laboratory parameters and their application to the treatment and monitoring of pharmacotherapy. Prerequisites: Clinical Biochemistry and Pathophysiology or equivalents. (U). Spring.

RX350, Introduction to Pharmaceutical Care 1: This course introduces the concept of pharmaceutical care and develops skills in drug information retrieval, descriptive statistics, and medical terminology. Prerequisites: P-1 standing in the professional pharmacy program, MA106, Calculus, and Analytical Geometry I. (U)(3). Fall.

RX351, Introduction to Pharmaceutical Care II: Knowledge and skill development focused on the pharmacist's role in receiving, interpreting, preparing, compounding, and dispensing prescriptions for patients. Skills in pharmaceutical calculations are also developed. Prerequisite: Introduction to Pharmaceutical Care I. (U)(4). Spring.

RX401, Introductory Pharmacy Practice Experience 2: This seminar course prepares pharmacy students for entrance into advanced rotations. Topics will vary according to section and may include professionalism, HIPPA, Indiana pharmacist intern registration, criminal background check, and ACPE graduation requirements. Prerequisite: RX301, (U)(0). (P/F). Fall.

RX403, Therapeutics 1 Case Studies: This course uses a case-based approach to the development and monitoring of therapeutic plans for selected diseases. Corequisite: RX413. Prerequisite: RX324. (U)(1). Fall.

RX404, Therapeutics II Case Studies: This course uses a case-based approach to the development and monitoring of therapeutic plans for selected diseases. Corequisite: RX414. Prerequisite: RX413. Spring.

RX411, Principles of Drug Action I: This course creates the drug knowledge base that can be applied to solve therapeutic problems of patients. Selected drug categories are considered. Prerequisites: RX314, RX318. (U)(1). Fall.

RX412, Principles of Drug Action II: This course creates the drug knowledge base that can be applied to solve the therapeutic problems of patients. Drug classes considered include cardiovascular and renal drugs, antihistamines, and nonsteroidal anti-inflammatory drugs. Prerequisites: RX314, RX318. (U)(4). Spring.

RX413, Therapeutics I: A consideration of the pathophysiology and therapy of selected diseases that are commonly managed. Emphasis is placed on the provision of pharmaceutical care through the selection of appropriate therapy, therapeutic monitoring, and the prevention and identification of adverse drug reactions and interactions. Prerequisite: RX324, Pre or Corequisite: RX403, RX411. (U). Fall.

RX414, Therapeutics II: This is a continuation of Therapeutics I and is a consideration of the pathophysiology and therapy of selected diseases that are commonly managed. Emphasis is placed on the provision of pharmaceutical care through the selection of appropriate therapy, therapeutic monitoring, and the prevention and identification of adverse drug reactions and interactions. Prerequisites: RX413 with a grade of C or higher; Pre- or co-requisite RX412, Corequisite RX404. (U)(3). Spring.

RX415, Self-Care and Health Promotion I: To develop, use, and evaluate self-care strategies to assist patients in assessing their health status to achieve and maintain optimal health. Topics include nutrition, exercise, immunizations, preventative screenings, vitamins, herbals, nonprescription medications, home monitoring techniques, nonpharmacological treatments, and adverse drug events (ADE) detection and reporting. Prerequisite: RX301. (U)(2). Fall.

RX416, Self-Care and Health Promotion II: A continuation of Self-Care and Health Promotion I. Prerequisites: Self-Care and Health Promotion I (RX415). (U)(3). Spring.

RX421, Introduction to Dosage Forms: This lecture and laboratory course correlates physical properties of drugs and additives to the design of solid, liquid, and semi-solid dosage forms. Prerequisites: RX351. (U)(4). Fall.

RX422, Advanced Dosage Forms: This course develops concepts and skills in designing and preparing rate-controlled drug delivery systems including sterile, parenteral dosage forms, and enteral nutrition formulations. Prerequisites: Introduction to Dosage Forms. (U)(4). Spring.

RX432, Personnel and Financial Management: Personnel and resource management and basic accounting and marketing skills essential for pharmacy practice management. Prerequisite: P-1 standing in the professional pharmacy program. (U)(3). Spring.

RX500, Introduction to Experiential Rotation: This is a seminar course which prepares the pharmacy student for the final year of the professional curriculum. Topics are discussed which impact the practice of pharmacy, including new treatments and delivery systems, ethics, quality/risk management, malpractice/liability insurance, informed consent, management of medical information/patient confidentiality, third part, reimbursement and pharmacist/patient/physician relationships. Prerequisites: P-3 standing in pharmacy program and P-4 standing anticipated by May. (U)(1). Spring.

RX501, Introductory Pharmacy Practice Experience III: This is a seminar course which prepares pharmacy students for entrance into the advanced rotations. Topics will vary according to section and may include professionalism, HIPPA, Indiana pharmacist intern registration, criminal background check, and ACPE graduation requirements. Prerequisites: RX301, RX401. (U)(0). (P/F). Fall.

RX503, Therapeutics III Case Studies: A case-based approach to the development and monitoring of therapeutic plans for selected diseases. Corequisite: RX513. Prerequisite: RX414. (U)(1). Fall.

RX504, Therapeutics IV Case Studies: A case-studies approach to the development and monitoring of therapeutic plans for selected diseases. Co-requisite: RX 514. Prerequisite: RX 513. (U)(1). Spring.

RX511, Principles of Drug Action III: The course creates the drug knowledge base that can be applied to solve therapeutic problems of patients. Selected drug categories are considered. Prerequisites: RX318 Intro to PDA, RX314 Pharmaceutical Biotechnology. (U)(4). Fall.

RX513, Therapeutics III: This course is a continuation of Therapeutics II with emphasis placed on the selection of appropriate therapy, therapeutic monitoring, and the prevention and identification of adverse drug reactions and interactions for selected diseases. Prerequisite: RX414, RX404 with a grade of C or higher. Pre or Corequisite: RX503, RX511, RX522. (U)(3). Fall.

RX514, Therapeutics IV: This is a continuation of Therapeutics III with an emphasis placed on the selection of appropriate therapy, therapeutic monitoring, and identification of adverse drug reactions and interactions for selected diseases. Co-requisite: RX504. Prerequisite: RX513, RX503. Co-requisite: RX504. (U)(3). Spring.

RX522, Pharmacokinetics and Biopharmaceutics: A consideration of the biological and physico-chemical factors that affect the delivery of drug to its site of action in the body and the basic principles of pharmacokinetics. Prerequisite: RX412 and RX422. (U)(3). Fall.

RX523, Clinical Pharmacokinetics: Clinical Pharmacokinetics integrates serum drug concentrations in patients with the principles of biopharmaceutics, pharmacokinetics, and pharmacodynamics to achieve therapeutic goals for individual patients. Prerequisite or Co-requisite: RX503, RX511, RX513, and RX522. Co-requisite: RX504, RX514. (U)(3). Spring.

RX526, Pharmacy, Policy, and the Law: Examines the legal constraints on pharmacy practice including state and federal laws and regulations. Laws affecting the business of pharmacy are examined along with legend drug and controlled substance laws. Issues of ordering, storage, distribution, and counseling are discussed. Policy analysis of pharmacy law issues are explored in this course. Prerequisite: P-3 standing. (U)(3). Spring.

RX527, Biostatistics and Research Design: The course develops the essential skills for designing research studies and for using statistical analysis to interpret data and to communicate inferences drawn from data interpretation. Prerequisite: P3 standing in the doctor of pharmacy program. (U)(3). Fall.

RX528, Advanced Drug Information and Literature Evaluation: The course develops the skills essential for drug information retrieval and analysis and the formulating

and communicating of written responses to drug information questions utilizing general references and primary literature. Prerequisite: RX 513, RX 527. (U)(2). Spring.

RX601, Independent Study: Pharmacy and Health Sciences: An opportunity for qualified students to pursue investigative work in pharmacy and health sciences. Prerequisite: Approval of COPHS Academic Affairs Committee. Students who are on professional or university probation are not eligible for independent study. (U/G)(1).

RX602, Independent Study: Pharmacy and Health Sciences: An opportunity for qualified students to pursue investigative work in pharmacy and health sciences. Prerequisite: Approval of COPHS Academic Affairs Committee. Students who are on professional or university probation are not eligible for independent study. (U/G)(2).

RX603, Independent Study: Pharmacy and Health Sciences: An opportunity for qualified students to pursue investigative work in pharmacy and health sciences. Prerequisite: Approval of COPHS Academic Affairs Committee. Students who are on professional or university probation are not eligible for independent study. (U/G)(3).

RX607, Doctor of Pharmacy Senior Seminar I: Students will improve formal presentation skills by observation and practice. Each student will prepare and present to faculty and peers a series of presentations including a formal seminar presentation and a poster presentation. Presentation preparation includes a critical review of the literature and case discussions pertaining to issues of pharmacy practice. Seminars are (P/F) offerings. Prerequisite: P-4 standing in the pharmacy program. (P/F). (U)(1). Fall.

RX608, Doctor of Pharmacy Senior Seminar 2: Students will improve formal presentation skills by observation and practice. Each student will prepare and present to faculty and peers a series of presentations including a formal seminar presentation and a poster presentation. Presentation preparation includes a critical review of the literature and case discussions pertaining to issues of pharmacy practice. Seminars are (P/F) offerings. Prerequisite: P-4 standing in the pharmacy program. (P/F). (U)(1). Spring.

RX609, Special Topics in Pharmacy and Health Sciences: A course allowing students to explore contemporary topics in pharmacy and health sciences. Prerequisites and corequisites are dependent on the specific topic and level of presentation. (U/G)(1) Annually, term varies.

RX610, Special Topics in Pharmacy and Health Sciences: A course allowing students to explore contemporary topics in pharmacy and health sciences. Prerequisites and corequisites are dependent on the specific topic and level of presentation. (U/G)(2). Annually, term varies.

RX611, Special Topics in Pharmacy and Health Science: A course allowing students to explore contemporary topics in pharmacy and health sciences. Prerequisites and corequisites are dependent on the specific topic and level of presentation. (U/G)(3). Annually, term varies.

RX612, Clinical Drug Development: This course provides students with in-depth knowledge of the pharmacist's regulatory role in drug development and clinical investigation. Prerequisite: Permission of instructor. (U)(2). Spring.

RX613, Clinical Research Methods: This course introduces students to clinical research: investigations performed on human subjects in a clinical setting. Students will develop a clinical protocol, discuss issues encountered during protocol implementation, and write an abbreviated clinical study report. This course employs a "hands-on," application-oriented approach to learning the clinical research process. (U/G)(3). Annually, term varies.

RX614, Health Economics: This course will provide a basic understanding of modern health economics concepts and methodologies, as well as a broader view of the value of disease state management and outcomes research. Prerequisite: RX713 Biostatistics and Research Design or permission of instructor. (U/G)(3). Annually, term varies.

RX615, Introductory Medical Spanish: A focus on health care to give the students the opportunity to become comfortable with conversational Spanish and medical terminology in various pharmaceutical contexts; learn intensive vocabulary and conversation exercises to improve their communication skills with patients—a guided learn-by-doing

approach. Prerequisites: SP204 or higher on placement test, completion of SP203 or equivalent, or permission of instructor. (U)(3). Fall and spring.

RX616, Critical Care: The purpose of this elective course is to develop a broad knowledge base of common critical care disease states and management strategies as it relates specifically to drug therapy. The course design will include a combination of both lecture and case-based classroom discussion with the focus being on case discussions. Completion of all PharmD P-2 courses or permission of instructor. (U)(3). Annually, term varies.

RX617, Advanced Medical Spanish: The development of Spanish communication skills around various health-related themes such as: anatomy of the human body, depression, drug abuse, emergency medicine, cardiovascular disease, respiratory disease, maternity, and diagnostic procedures. In addition, the student is required to complete a research paper in Spanish. Prerequisite: Completion of RX615 Intro to Medical Spanish or completion of the Spanish placement exam with placement at the 300 level or higher. (U)(3). Fall and spring.

RX618, Nutritional Support: This course will provide exposure to the fundamentals of specialized nutrition support with emphasis on management of complex patients with multiple disease processes and co-morbid medical conditions. Prerequisite: completion of all Pharm.D., P-2 courses or permission of instructor. (U)(3). Annually, term varies.

RX619, Spanish Service Learning: This course will increase medical fluency in Spanish and encourage community cultural experiences. In addition to the two weekly sessions in class, each student will complete the community component of 20 hours of supervised volunteer work at a Spanish Speaking Clinic. Prerequisite: Medical Spanish at the 300-level. (U)(3). Annually, term varies.

RX620, Teaching with Technology: Students will develop their knowledge and skills as possible future teachers using instructional technology to enhance student learning. Laptop or tablet PC with wireless access to the Butler network are required in class. Prerequisite: Professional phase standing in the pharmacy or physician assistant programs. (U)(2). Fall.

RX621, Pharmacy-Based Immunizations: This course will prepare the student to become a certified pharmacist-immunizer through successful completion of the American Pharmacists Association Pharmacy-Based Immunization Deliver certificate training program. Prerequisite: Current fourth year pharmacy student, active CPR certification, and willingness to practice injection technique on each other. (U)(2). Fall.

RX622, Drug Disposition and Drug Interactions: This course will focus on the fundamentals of drug disposition, especially as they relate to drug-drug interaction, individual response to drugs, genetic composition in relation to drug response, and factors that alter the body's ability to handle drugs. Prerequisite: P-3 standing or permission of instructor. (U)(3). Spring.

RX624, Substance Abuse and Drug Addiction: The goal is to expose students to the prevalence of substance abuse and drug addition; understand the pharmacist's role in addiction prevention, treatment and recovery; and equip them to manage these circumstances in their professional careers. Focus includes non-prescription, prescription, and illicit drugs of abuse. (U)(3). Spring.

RX625, Advanced Drug Delivery: Critical assessment of drug carrier systems, including transport of drug molecules across membranes. By permission only. (U)(3). Annually, term varies.

RX630, Advanced Toxicology: The principles of toxicological mechanisms or drugs and environmental chemicals in the biological systems. Prerequisite: Clinical Biochemistry or equivalent, or permission of the instructor. (U/G)(3). Annually, term varies.

RX631, Molecular Biology/Pharmacology: This course covers concepts of molecular biology in application to drug action and new drug development. Specific sections cover consecutive steps leading to normal and pathological gene expression, cellular signal transduction/malfunction, molecular biology of cancer, and pharmacogenomics. Course includes introduction to current research methodology and analysis of scientific data. (U)(3). Annually, term varies.

RX632, Drug Abuse-Pharmacology, Chemistry and Social Aspects: This course will examine from a multidisciplinary perspective the phenomenon of the recreational use of mind-altering drugs like alcohol, nicotine, opioids, cocaine, and hallucinogens. Prerequisite: one semester of college-level biochemistry. (U/G)(3). Annually, term varies.

RX634, Seminars in Pharmaceutical Sciences: Presentation of research topics in pharmaceutical sciences by graduate students, faculty, and guest speakers. By permission only. (U)(1). Annually, term varies.

RX635, Internal Medicine Therapeutics: A capstone experience for students in their third professional year of the curriculum; covering topics encountered in a "general medicine" setting, including community, ambulatory, and inpatient hospital settings. Focus is on practical implementation of general medicine principles directed at pharmacist's point of view. Co-requisite: RX513. (U)(3). Annually, term varies.

RX636, Cardiovascular Therapeutics: This course will develop knowledge of treatment principles of major cardiovascular conditions with emphasis on reviewing and reading the landmark trials for why we treat cardiovascular diseases in clinical practice. Important clinical trials, treatment, guidelines, and several pharmacotherapeutic management strategies will be reviewed. Prerequisite: RX414 and RX404. (U)(3). Annually, term varies.

RX637, Drug Induced Diseases: This course will introduce students to relevant adverse reactions that occur with medication therapies; focusing on identification of the drug-induced disease and evaluation of potential causes. Students will develop skills and thought processes designed to systemically evaluate disease states and understand treatment algorithms. Co-requisite: RX513. (U)(3). Annually, term varies.

RX638, Diabetes Management: This elective provides concepts and clinical pearls of diabetes management. Students will learn to provide quality care education patients on self-management skills, providing therapeutic interventions, motivational interviewing, and counseling. Students will assist in the management of patients with diabetes while maintaining patient confidentiality and privacy. (U)(3). Annually, term varies.

RX639, Principles of Psychiatric Therapeutics: This course builds upon skills learned in Therapeutics III, providing broader knowledge base of psychiatric and neurologic disease states. Students will learn to provide the psychopharmacologic and therapeutic management strategies to treat these disorders and unique patient counseling skills essential to the development of patient relationships. Prerequisite: RX503 and RX513. (U)(3). Annually, term varies.

RX640, Entrepreneurship in Life Sciences: Entrepreneurialism in pharmacy is a course designed for pharmacy students interested in learning more about the business of pharmacy and healthcare and how to assume ownership and responsibility for any position they choose to accept during their professional career, whether or not s/he technically own the venture. (U/G)(3). Annually, term varies.

RX641, Pediatric Pharmacotherapy: A course dealing with drug therapy in the pediatric population including neonates, infants, children, and adolescents. This course prepares the student to evaluate pediatric drug therapy regimens. Prerequisite: Completion of all fourth year Pharm.D. courses or permission of the instructor. (U/G)(3). Annually, term varies.

RX642, Geriatric Therapeutics: A study of the physiologic and pharmacokinetic changes that occur with aging and how these changes affect drug therapy. Management of disease will be discussed and evaluated. This course will provide the student with knowledge for making therapeutic decisions in the elderly. Prerequisite: Completion of all fourth-year Pharm.D. courses or permission of instructor. (U/G)(3). Annually, term varies.

RX643, Pharmacotherapy of Renal Disease: This elective course addresses key pharmacotherapy principles associated with the prevention and treatment of acute and chronic renal disease. Topics will include drug induced acute kidney injury, contrast-induced nephropathy, renal dosing adjustments, anemia of chronic kidney disease, secondary hyperparathyroidism, and many others. Students will also tour a dialysis center. (U/G)(2). Fall.

RX644, Women's Health Issues: This course will include discussions on health issues that primarily affect women. Topics include menopause, breast cancer, silicone breast implants, systemic lupus, infertility, contraception, pregnancy, osteoporosis, women and heart disease, and other issues causing illness or death of women, including domestic violence. Prerequisites: RX413, RX 414. Pre- or Co-requisite: RX 513. (U)(3). Annually, term varies.

RX645, Pharmaceutical Literature: An exploration of sources of information applicable to the pharmaceutical sciences and a systematic approach to literature searches. One class hour per week. Prerequisite: Completion of all fourth-year Pharm.D. courses, or permission of instructor. (U/G)(1). Annually, term varies.

RX646, Ambulatory Care: The focus of this course will be on designing and developing ambulatory care pharmacy services, along with assessing and educating the ambulatory care patient. Students will be introduced to medication therapy management (MTM) and will be given the opportunity to interact and work with local ambulatory care pharmacists. (U/G)(3). Spring.

RX647, Exploring Public Health: In this interactive course, students are encouraged to examine, explore, and solve public health issues of interest and examine solutions for the same. It will allow students to think critically about how to identify and address current health issues from childhood immunizations to toxic exposures in the workplace. (U)(3). Annually, term varies.

RX648, Infectious Diseases Pharmacotherapy: This elective course is designed to enhance the students' knowledge, skills, and experience with infectious diseases pharmacotherapy. The course will employ the use of didactic lecture, case based topic discussion, active learning assignments, and primary literature evaluation to enhance class interaction and facilitate understanding of lecture topics. (U/G)(3). Spring.

RX649, Neurobiology of Stress and Trauma: Students will learn to understand the neuropathological effects of stress from a systems, developmental, neurochemical, cellular, and molecular perspective. This course examines the phenomenology and neurobiological mechanisms associated with stress and trauma as they relate to the topics to be covered. (U)(3). Annually, term varies.

RX650, Academic Experience Rotation: This rotation provides the student pharmacist with experience in the role of the doctor of pharmacy in classroom teaching and with the operations of an academic institution. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX651, Administration and Management Rotation: This rotation provides the student pharmacist the opportunity to develop skills in fiscal, organization, and personnel management. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX652, Advanced Ambulatory Care Rotation: This rotation provides the student pharmacist with further experience in application of therapeutic principles to the patient in the ambulatory setting. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX654, Advanced General Medicine Rotation: This rotation stresses the pharmacist's role in proper drug therapy, patient education, drug administration techniques, and delivery of pharmacy services to hospitalized and ambulatory patients. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX655, Prescription Compounding Rotation: This rotation provides the student pharmacist experience in the extemporaneous compounding of medicinal products and will be used for the treatment and/or prevention of disease in humans. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX656, Alt Comp Med Rotation: This rotation provides the student pharmacist with experience in the use of herbal, probiotic, nutritional, and other alternative modalities. Prerequisite: P-4 standing. (U)(4).

RX657, Ambulatory Care Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the application of therapeutic principles to the care of patients receiving care in the ambulatory medicine clinic. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX658, Cardiology Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the application of therapeutic principles to the care of patients who have cardiovascular disorders. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX659, Clinical Community Pharmacy Practice Rotation: This rotation focuses on detection and reporting of adverse drug reactions, monitoring compliance, detecting and evaluating drug interactions, interviewing and history taking, how to use knowledge of pharmacology and physiology to solve problems in therapeutics and how to effectively communicate. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX660, Clinical Research Rotation: This rotation will focus on legal considerations in conducting clinical research, protocol design, budgetary considerations, informed consent, peer review process, and investigational drug control. Prerequisite: P-4 standing. (U/G)(4).

RX661, Community Practice Rotation: This course is concentrated on the basic operational skills necessary for practice in a community pharmacy setting. The primary focus of activities will be on distribution and work flow in a community setting. (U)(4). Annually, term varies.

RX662, Critical Care Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the application of therapeutic principles to the care of patients whose health is in critical condition. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX663, Disease State Mgmt Rotation: This rotation provides the student pharmacist with an understanding of the drug therapy and monitoring involved with common disease states and medical conditions. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX664, Drug Information Rotation: This rotation enhances the student's skills in communication, both verbal and written, and the student's skills in the retrieval, evaluation, and provision of drug-related information. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX665, Emergency Med/Trauma Rotation: This rotation provides the student pharmacist with experience in the special needs of patients receiving care in the emergency department. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX666, General Medicine Rotation: A hospital-based rotation utilizing faculty experienced in general internal medicine and/or family practice. The goal of this general rotation is to familiarize the student with those disease processes routinely managed by internal medicine and family practice in the acute care setting. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX667, Geriatric Medicine Rotation: This rotation stresses the role of the pharmacist in the care of the geriatric patient through interdisciplinary activity. The student will interact with other health care professionals to optimize the care of the geriatric patient. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX668, GI/Liver Renal Rotation: This course is an acute care rotation that focuses on a specific specialty practice: GI, renal, or liver. This type of rotation will be with a practitioner with daily activities in the identified practice area. Prerequisite: Successful completion of a General Medicine Rotation. (U)(4). Annually, term varies.

RX670, Home Health Care Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the clinical and distributive services in the home health care environment. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX671, Industrial Pharmacy Rotation: The industrial pharmacy rotation will focus on developing an understanding of opportunities available for the pharmacist in the pharmaceutical industry. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX672, Infectious Diseases Rotation: This rotation focuses on the proper selection of antimicrobial, antifungal, and antiviral therapy, understanding the associated disease states, patient education, and pharmacy administration issues associated with patients

with infections. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX673, Health Policy Rotation: The rotation introduces the student to the roles and authority of various governmental and regulatory agencies that establish and implement health care policy. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX674, Long-Term Care Rotation: This rotation is designed to develop the student pharmacist's knowledge and problem-solving skills in clinical and distributive services in the long-term care environment. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX675, Managed Care Rotation: This rotation provides the student pharmacist experience with the medical treatment of patients in a managed care system. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX676, Institutional Practice Rotation: This course is concentrated on the basic operational skills necessary for practice in an institutional pharmacy setting. The primary focus of activities will be on distribution and work flow in an institutional setting. (U)(4). Annually, term varies.

RX677, Neurology Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the application of the therapeutic principles to the care of patients who have neurological disorders. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX678, Nutrition Support Rotation: This rotation focuses on nutritional assessment and requirements, parenteral nutrition, enteral nutrition, nutritional support for disease states, and nutritional support in specific patient populations. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX679, Oncology Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the application of the therapeutic principles to the care of patients who have a malignancy. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX681, Neonatology Rotation: The rotation provides opportunities for the student pharmacist to participate in the care of neonates in the acute care setting. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX682, Pediatric Rotation: This rotation focuses on illnesses of the pediatric population, the physiologic differences in infants and children and how this affects drug therapy, how to solve problems in pediatric therapeutics, and how to effectively communicate about pediatric issues. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX683, Pharm Marketing/Sales Rotation: This rotation provides the student pharmacist with an understanding of the pharmacist's role in industry by making use of pharmacoeconomic principles. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX684, Pharmacoeconomics and Outcomes Research Rotation: This rotation provides the student pharmacist experience with the utilization of pharmacoeconomic parameters in assessing the health outcomes involved in the management of patients. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX685, Pharmcokinetics Rotation: This rotation provides the student pharmacist experience in the monitoring of pharmacokinetically-administered medications. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX686, Pharmacy Systems/Tech Rotation: This rotation provides the student pharmacist experience with the organization of a medication use system and the associated use of technology. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX687, Poison Control/Toxin Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the application of therapeutic principles to the care of patients who have ingested, or have otherwise been exposed to, toxic substances. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX688, Pulmonary Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the application of therapeutic principles to the care of patients who have pulmonary disorders. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX689, Veterinary Medicine Rotation: This rotation provides experience in the care of animals with an emphasis on the use of drug therapy to cure or prevent disease. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX690, Psychiatry and Neuropsychology Rotation: This rotation is designed to provide the student experience in the specialized clinical area of psychiatry with an emphasis on the use of drug therapy in the group of patients. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX691, Radiopharmaceutical Rotation: This rotation provides the student pharmacist experience with the use of radiopharmaceuticals in the diagnosis and treatment of medical conditions. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX692, Indigent Care Rotation: This rotation provides the student pharmacist with an understanding of the special considerations involved in the delivery of health care to indigent populations. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX693, Pharmacy Board and Association Rotation: This rotation develops the student pharmacist's understanding of the organizational structure of the pharmacy board and state pharmacy associations, their daily operation, and the manner in which they influence pharmacy practice. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX694, Surgery Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the application of therapeutic principles to the care of patients who undergo surgery. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX695, Transplantation Rotation: This rotation develops the student pharmacist's knowledge and problem-solving skills in the application of therapeutic principles to the care of patients who have undergone organ transplantation. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX698, Washington, D.C. Rotation: The rotation experience provides an opportunity to participate in a three-month learning opportunity in the Washington, D.C. area arranged through the Butler-Washington Semester Intern Program. The experiential learning portion of this program is arranged individually based on specific student interests. The college requires that students participating in this program also enroll in P0355 or AH110/AH202 and at least one, one-credit hour Washington seminar course. Prerequisite: P-4 standing. (P/F). (U)(12). Annually, term varies.

RX699, Spec Topics: Pharmacy Practice Rotation: Elective Rotation in Pharmacy Practice: An experiential course that allows students to explore new developments in delivery of pharmacy services. Rotation sites will vary depending upon the area of pharmacy practice being investigated. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX700, Regulatory Affairs and Pharmacovigilence Rotation: This rotation provides the student pharmacist an opportunity to participate in and to better understand the various regulatory agencies and processes that assure the safety and efficacy of drug therapies available for human use. Prerequisite: P-4 standing. (U)(4). Annually, term varies.

RX701, Research and Thesis: Research toward completion of thesis in pharmaceutical sciences. Prerequisite: GPA of 3.0 or above, exclusive of research and thesis credits. (G)(1). Annually, term varies.

RX702, Research and Thesis: Research toward completion of thesis in pharmaceutical sciences. Prerequisite: GPA of 3.0 or above, exclusive of research and thesis credits. (G)(1). Annually, term varies.

RX703, Research and Thesis: Research toward completion of thesis in pharmaceutical sciences. Prerequisite: GPA of 3.0 or above, exclusive of research and thesis credits. (G)(2). Annually, term varies.

RX704, Research and Thesis: Research toward completion of thesis in pharmaceutical sciences. Prerequisite: GPA of 3.0 or above, exclusive of research and thesis credits. (G)(2). Annually, term varies.

RX705, Research and Thesis: Research toward completion of thesis in pharmaceutical sciences. Prerequisite: GPA of 3.0 or above, exclusive of research and thesis credits. (G)(3). Annually, term varies.

RX706, Research and Thesis: Research toward completion of thesis in pharmaceutical sciences. Prerequisite: GPA of 3.0 or above, exclusive of research and thesis credits. (G)(3). Annually, term varies.

RX735, Applied Statistics in Pharmaceutical Research: The application of statistics to the main facets of pharmaceutical research, from research study design to data collection and analysis. Will include clinical trial design and analysis, drug utilization reviews, retrospective analyses, quality of life and cost effectiveness studies, evaluating research literature, and pharmaceutical manufacturing data. Prerequisite: Permission of instructor. (G)(3). Annually, term varies.

RX766, Advanced Topics in Neuropharmacology: Discussions and formal presentations covering basic concepts and recent advances in clinical applications of pharmacology to psychogenic disorders. Prerequisite or Corequisite: Permission of instructor. Annually, term varies.

RX780, Current Topics in Pharmaceutical Sciences: Discussion of current research topics in pharmaceutical sciences. (G)(1). Annually, term varies.

RX781, Seminars in Pharmaceutical Sciences: Presentation of research topics in pharmaceutical sciences by graduate students, faculty, and guest speakers. (G)(1). Annually, term varies.

RX782, Ethics in Research: Discussion and case-based approaches in the ethics of research, publication, and reviewing of manuscripts and grants. Include core instructional areas recommended by the NIH Office of Research Integrity. (G)(1). Annually, term varies.

RX783, Introduction to Pharm Research: An introduction to basic principles of pharmaceutical research including formation of hypothesis, literature search, scientific writing, and regulatory affairs. (G)(2). Annually, term varies.

RX784, Experimental Design and Data Analysis: Approaches in experimental design and statistical analysis of data. (G)(2). Annually, term varies.

RX785, Biopharmaceutical Analysis: Theory and practice of bioanalytical techniques in chemical and molecular biology based analyses. Prerequisite: B.S. level background in Analytical Chemistry. (G)(3). Annually, term varies.

RX786, Advanced Drug Delivery: Critical assessment of drug carrier systems, including transport of drug molecules across membranes. Prerequisite: instructor's permission. (G)(3). Annually, term varies.

RX787, Industrial Pharm: Pref/Prod Dev: Study of physicochemical principles of drugs and excipient for optimization of bioavailability. Case studies in formulation, production, and evaluation of pharmaceutical products. Prerequisite: instructor's permission. (G)(3). Annually, term varies.

RX788, Molecular Biology/Pharmacology: This course covers concepts of molecular biology in application to drug action and new drug development. Specific sections cover consecutive steps leading to normal and pathological gene expression, cellular signal transduction/malfunction, molecular biology of cancer, and pharmacogenomics. Course includes introduction to current research methodology and analysis of scientific data. (G)(3). Annually, term varies.