

**DOCTOR OF PHARMACY  
AND  
DOCTOR OF PHILOSOPHY  
COMBINED DEGREE PROGRAM**

**UNIVERSITY OF FLORIDA  
COLLEGE OF PHARMACY**

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## **INTRODUCTION**

The University of Florida College of Pharmacy offers a combined Doctor of Pharmacy (Pharm.D.) and Doctor of Philosophy (Ph.D.) degree program for qualified Doctor of Pharmacy students who are interested in accelerated graduate studies. The purpose of this program is to prepare clinically oriented pharmaceutical scientists. Through the selection of appropriate graduate level courses and attainment of research skills and experience through research clerkships, students in the Doctor of Pharmacy program can receive advanced standing in one of the graduate pharmaceutical science disciplines in the College of Pharmacy. The combined program could enable students to attain both degrees within a time frame of approximately nine years of study from the beginning of college. This includes at least two years of prepharmacy studies, four years of professional education, and approximately three to four years of graduate studies.

The benefits of a combined Pharm.D./Ph.D. degree program are several fold: First, the student can select 5000-6000 level graduate courses which will satisfy requirements for both programs thus shortening the length of the program. Second, the student can develop during his/her initial years in the College of Pharmacy an appreciation of and an aptitude in research. Third, the student can identify a research area and a faculty advisor prior to beginning the Ph.D. component of the program. Fourth, by tracking into the Pharm.D./Ph.D. program, the student can better appreciate the importance of didactic material presented in professional courses to their area of proposed graduate study and research. A further advantage of Pharm.D./Ph.D. degrees over a combination of a baccalaureate in the sciences, e.g., chemistry or biology, and a Ph.D. in the pharmaceutical sciences is that the individual would have attained a much broader range of pharmaceutical knowledge and clinical experience. The net result of this should be an individual better prepared for research in the pharmaceutical sciences with a greater potential to rapidly move upward in the pharmaceutical industry or academia or governmental agency.

## **CAREER OPPORTUNITIES**

Graduates with the Doctor of Pharmacy and the Doctor of Philosophy degrees are very competitive for research positions in the pharmaceutical industry, governmental agencies (e.g., National Institutes of Health, Food and Drug Administration), and in academia. The clinical emphasis of the Doctor of Pharmacy program and the in-depth scientific education obtained from a Doctor of Philosophy degree in a pharmaceutical science prepares the individual for research and teaching that could integrate clinical and pharmaceutical research. Graduates have the potential to fulfill a vital role in the pharmacy profession as clinical scientists.

A combined degree program can give the graduate the knowledge and experience for productive research, teaching, and service in a variety of positions within pharmacy. Positions in industry include research scientists in Research and Development and in Production and Quality Control. Senior level positions such as a Head of a research division or Vice President for Research or Vice President of Industry Affairs are available within a pharmaceutical company. Professorial positions in colleges of pharmacy offer the Pharm.D./Ph.D. graduate opportunities for independent research, teaching, and

clinical service. Administrative and management positions in academia, the pharmaceutical industry, and in governmental agencies are attainable by graduates of a rigorous Pharm.D./Ph.D. program. The authority, prestige, superior income, and influence associated with these positions can enable one to have a very significant impact on the profession of pharmacy and the health care industry.

## **THE UNIVERSITY OF FLORIDA**

The University of Florida is one the truly distinctive universities in the United States. It is among the nation's 25 largest universities with an enrollment of over 42,000 students. The University affords laboratories and libraries among the best in the nation for a faculty that includes leading scholars in their respective fields of study and research. Over 1500 faculty members and graduate students are awarded research and training grants annually, ranking the University of Florida among the nation's top 40 research universities. The University of Florida is a member of the Association of American Universities (AAU), the most prestigious organization in higher education. Only those universities judged to be preeminent in graduate and professional education and research are invited to membership in the AAU.

## **THE HEALTH SCIENCE CENTER**

The Health Science Center at the University of Florida is composed of six colleges: Medicine, Nursing, Health Related Professions, Pharmacy, Dentistry, and Veterinary Medicine. Patients receive health care at the Shands Hospital, Veterans Administration Medical Center, Student Health Service, and in Jacksonville at University Medical Center. The complex also includes a health science library with over 200,000 volumes, numerous laboratories, and one of the nation's most comprehensive animal resource facilities. The Health Science Center provides the necessary facilities, faculty, and staff support to enable quality programs in clinical service and research.

## **THE COLLEGE OF PHARMACY**

The University of Florida College of Pharmacy is among the top pharmacy schools in the nation and one of the few located in an academic health center encompassing most of the health professions. The College has matured to a state of excellence with more than 45 faculty members, 60 graduate students, over 40 post-doctoral fellows, and 450 pharmacy students.

The College offers a four-year entry level program leading to the Doctor of Pharmacy degree. A two-year prepharmacy program is required before acceptance into this program. The curriculum in pharmacy is designed to provide the graduate with the scientific, professional, and cultural background required for the successful practice of pharmacy. The curriculum also provides an excellent foundation for advanced study leading to careers in research, teaching, and management.

Areas of emphasis in the curriculum are pharmaceuticals, medicinal chemistry, pharmacodynamics, pharmacy health care administration, and pharmacy practice.

The College of Pharmacy is accredited by the American Council on Pharmaceutical Education and is a member in good standing of the American Association of Colleges of Pharmacy.

Requirements for admission to the professional program are discussed in detail in the University of Florida Undergraduate Catalog and in the College of Pharmacy brochure. In summary, applicants must submit all official transcripts of college course work and an application form to the University of Florida Registrar. The College of Pharmacy will evaluate the transcripts for completion of prepharmacy courses, and calculate GPA's in science/math course work within the prepharmacy courses.

Required prepharmacy courses are 8 credits each of general chemistry, general biology (or, botany and zoology), organic chemistry, and 6-8 credits of physics; 3 credits of Calculus I. Students should complete general education courses in English composition, social sciences, and humanities to obtain an Associates in Arts Degree. Beginning in 2001, all admitted students must complete 8 credits of anatomy and physiology and 3 credits of public speaking. These courses may be taken at any accredited community college or four year college or university.

A Pharmacy College Admission Test (PCAT) score is also required. This test can be taken three times within the academic year the student wishes to enter the College of Pharmacy. For more information on the PCAT contact The Psychological Corporation, Project 604/PCAT, 555 Academic Court, San Antonio, Texas 78204.

In addition to the above credits in prepharmacy courses and PCAT scores, the College requires a passing grade on the College Level Academic Skills Test (CLAST) and two letters of recommendation, a personal profile, and essays on selected topics in pharmacy. These latter three forms are sent to the applicant once the College has evaluated transcripts and determined that the applicant has at least a minimum 3.0 GPA in prepharmacy science and math courses at the time of application. Information on the CLAST is available in the University of Florida Undergraduate Catalog.

## **DOCTOR OF PHARMACY PROGRAM**

The Doctor of Pharmacy program is designed to produce practitioners whose skills, judgment, self-confidence, and knowledge allow an enhanced patient-oriented pharmacy practice. Coursework includes physiological basis of disease, biochemistry, microbiology-immunocology, pharmaceuticals, biopharmaceuticals, pharmacokinetics, medicinal chemistry, pharmacology, biostatistics, pharmacotherapy, physical assessment, medication use processes, pharmacy calculations, compounding and parenterals, nonprescription products, quality assurance, professional

communications, pharmacy management, a pharmaceutical outcomes evaluation and pharmacy law and ethics. In addition, eleven months of clerkship experiences are required. These clerkships include a required core of general medicine, pediatrics, ambulatory care, and drug information services. Elective clerkships may include research and administrative experiences.

## **DOCTOR OF PHARMACY/DOCTOR OF PHILOSOPHY PROGRAM**

Those students who select the Doctor of Pharmacy/Doctor of Philosophy program may take graduate level courses and take four months of research clerkships. Students may receive advanced graduate course credit in a Ph.D. program by taking appropriate 5000 and 6000 level required and elective courses in the Pharm.D. program. Students can complete graduate courses and pursue research in the departments of Pharmaceutics, Medicinal Chemistry, Pharmacodynamics, and Pharmacy Health Care Administration.

Students interested in the combined degree program must apply to the Graduate School no later than the beginning of the third professional year in the Pharm.D. These courses provide advanced preparation and standing in a Doctor of Philosophy program in the College of Pharmacy. Pharmacy students must be accepted by the Graduate School and one of the pharmaceutical science departments in the College of Pharmacy. Admission criteria include a minimum grade point average of 3.2 in pharmacy course work and a minimum Verbal-Quantitative total score of 1100 on the Graduate Record Examination (GRE). For more information on admission to the Graduate School consult the University of Florida Graduate Catalog.

Students may initiate application to the Pharm.D./Ph.D. program by contacting one of the graduate coordinators or chairpersons in each of the departments that offer a Ph.D. in the Pharmaceutical Sciences. **Early contact** is recommended in order to plan the course of study to take full advantage of 5000-6000 course offerings so that the maximum of 16 credits can be credited toward graduate course requirements while in the Doctor of Pharmacy program.

Students may submit an application to one of the pharmacy graduate departments. The application includes (1) a statement of his/her intent to pursue the Pharm.D./Ph.D. program, (2) a one page composition stating their career goals and reasons for choosing the program, (3) a copy of transcripts of their prepharmacy and Pharm.D. course work, and (4) three letters of recommendation from individuals who are familiar with the candidate and who can comment on their appropriateness for graduate studies.

Students accepted into the Pharm.D./Ph.D. program will be guaranteed a stipend (either a research or teaching assistantship) to help finance expenses for graduate studies. This stipend is granted once the student has completed the Doctor of Pharmacy degree and has begun further graduate studies in the College of Pharmacy.

### **College of Pharmacy Departments**

## **with a Pharm. D./Ph.D. Program**

### Department of Pharmaceutics

Pharmaceutics can be defined as the scientific endeavor concerned with the design, formulation, evaluation, and use of drug delivery systems. A foundation in physical chemistry, chemistry, mathematics, as well as the life sciences, is necessary. Its domain extends from studies of the physiochemical properties of drugs and related molecules to investigations of the mechanisms of physiological processes affecting drug delivery and therapeutic effectiveness. Pharmaceutics is an interdisciplinary field of research. In addition to the above mentioned fields, pharmaceutics is rapidly expanding into such areas as computer sciences, biotechnology, cell and molecular biology, and biomedical engineering. The variety of basic, applied and clinical research projects reflects the interdisciplinary character and orientation of pharmaceutics towards emerging new fields in the pharmaceutical sciences, in particular biotechnology-oriented research.

The Department of Pharmaceutics consists of faculty members who conduct research in a variety of areas of pharmaceutical science. These areas of research include studies to determine the correlation of pharmacokinetic and pharmacodynamic behavior of drugs; to assess drug stability; to evaluate the interactions of drugs with macromolecules; to analyze peptides and proteins in biological fluids; to develop novel drug delivery systems including liposomes, microemulsions, and mixed-micelles.

The Pharmaceutics Department offers the following graduate courses: Clinical Pharmacokinetics, Biopharmaceutics, Pharmacokinetics and Biopharmaceutics, Stability and Kinetics of Drugs, Pharmaceutical Analysis I and II, Equilibria, Complexations, and Interactions of Drugs, Parenterals, Pharmaceutical Biotechnology, Pharmaceutical Product Formulation, Advanced Topics in Pharmaceutical Sciences.

### Department of Medicinal Chemistry

The field of Medicinal Chemistry uses the disciplines of organic chemistry, biochemistry, analytical chemistry, pharmacology and toxicology in the design or development of safe therapeutic agents. Advances in these basic disciplines have made it possible to understand the molecular basis for drug action and for adverse drug reactions, thereby enabling modifications of known drug structures from natural or synthetic sources to make safer, more effective drugs or to design new drugs.

Research interests of faculty in the Department of Medicinal Chemistry include: isolation of drugs from natural products; synthesis of analogues of endogenous substances that have anticancer and antiviral activities; synthesis of prodrugs that enhance dermal delivery; studying the enzymology of drug-metabolizing enzymes with a view to predicting the in vivo fate of drugs and potentially toxic metabolites; developing new methods for drug delivery and analysis. Department faculty are well equipped to conduct state-of-the-art research, having  $^1\text{H}$  and  $^{13}\text{C}$  nuclear magnetic resonance spectrometers (NMR), UV-VIS spectrophotometers, an IR spectrophotometer, fluorescence

spectrophoometers, scintillation counters, HPLC equipment with UV=VIS, fluorescence and radiometric detectors, ultracentrifuges, electrophoresis and gel-scanning apparatus and fermentation equipment for culturing microorganisms.

The Department offers a required professional course series in Medicinal Chemistry and electives in Chromatographic Separations, Cancer Chemotherapy, Synthesis of Prodrugs, and Problems in Medicinal Chemistry. At the Graduate Level, courses are offered in Cancer Chemotherapy, Synthesis of Prodrugs, Natural Medicinal Products (two course series), Drug Metabolism and Toxicity, Synthesis and Modification of Drugs, Drug Design, Synthetic Medicinal Products, Chemical Spectroscopy, Equilibrium and Complexation, and Research in Medicinal Chemistry.

#### Department of Pharmacodynamics

Research in pharmacodynamics stresses the holistic approach to drug actions in living systems and is focused on neuropharmacology, cardiovascular, endocrine, and autonomic pharmacology, reproductive physiology, and temperature regulation. Research in these areas is applied to clinical problems such as aging, Alzheimer's disease, drug tolerance and dependence, menopause, hypertension, diabetes mellitus, and environmental toxicology.

The faculty are fully equipped for advanced research through instruments such as scintillation and gamma counters, physiographs, *in vitro* vascular apparatus, stimulators, fraction collectors, receptor binding apparatus, liquid chromatographs, centrifuges, and an operating animal facility.

Graduate course work in this Department is accomplished through a wide variety of offerings throughout the Health Center. Courses such as Autonomic and Cellular Pharmacology, Renal and Endocrine Pharmacology, Molecular Pharmacology, Neuropharmacology, Pathophysiology, Physiology of Respiration, Neonatal Physiology, Principles of Immunology, Endocrinology, Neurophysiology, Neuroendocrinology are among over 40 courses available to students who desire to pursue a combined Pharm. D./Ph.D. in the Department of Pharmacodynamics.

#### Department of Pharmacy Health Care Administration

Research in Pharmacy Health Care Administration focuses on various issues related to the use of medications in society including inappropriate prescribing, inadequate monitoring, and misuse of medications.

Areas of research of current interest to the faculty include estimating the costs of drug related morbidity and mortality; evaluating the prescribing process, medication use and related health care activities in patient populations; and, examining ways to improve prescribing and use of medications in various health care systems including devising systems for providing pharmaceutical care.

The Department offers a series of professional and graduate courses about the drug use process. The

graduate level courses cover the role of the patient, pharmacist, and physician in the drug use process, the role of drugs in society, and drug use control. Students in the graduate program also complete a core program and an individualized program of study including courses in research design, statistics, health administration, health economics, and medical sociology.