

# Doctor of Pharmacy (Pharm.D.) Degree

The Pharm.D. curriculum is designed to produce a scientifically and technically competent pharmacist who can apply this education in such a manner as to provide maximum health care services to patients. Students are provided with the opportunity to gain greater experience in patient close cooperative relationships with health practitioners. It is the goal of all pharmacy schools to prepare pharmacists who can assume expanded responsibilities in the care of patients and assure the provision of rational drug therapy.

If you examine several pharmacy college catalogs, you will notice that courses are similar but NOT identical. There are no rigid rules on curricula enforced on colleges, but a common core of subjects is found in every college of pharmacy curriculum. You will find that certain colleges emphasize certain subjects, and thus place less emphasis on others. Since you will likely examine catalogs of colleges that interest you, this summary will touch largely on the core of subjects common to most colleges of pharmacy.

## Length of Study

The Doctor of Pharmacy (Pharm.D.) degree program requires at least 2-years of specific pre-professional (undergraduate) coursework followed by 4-academic years (or 3-calendar years) of professional study. Pharmacy colleges and schools may accept students directly from high school for both the pre-pharmacy and pharmacy curriculum, or after completion of the college course prerequisites. The majority of students enter a pharmacy program with 3 or more years of college experience. College graduates who enroll in a pharmacy program must complete the full 4-academic years (or 3-calendar) years of professional study to earn the Pharm.D. degree. The AACP does not track the availability of accelerated programs of study for individuals with a baccalaureate degree in a related health career or science field.

## Goals of Degree Program

The professional pharmacy curriculum is designed to produce pharmacists who have the abilities and skills that are necessary to achieve outcomes related to:

- Providing pharmaceutical care to patients
- Developing and managing medication distribution and control systems
- Managing the pharmacy
- Promoting public health
- Providing drug information and education
- Major Areas of Instruction

## Major Areas of Instruction

In order to provide students with the opportunity to develop a strong foundation on which to build these skills, the curriculum emphasizes six major areas of instruction.

1. **Pharmaceutical chemistry** emphasizes the application of chemical sciences to pharmacy. Some of the courses deal with chemicals used as medicines-their use, nature, preparation and preservation. In other courses, attention is given to the processes and tests used to determine the purity and strength of a chemical or its pharmaceutical form. The pharmacy student learns, for

example, how to find out if aspirin is pure, or how to determine how much vitamin C is contained in a particular solution or tablet.

2. **Pharmacognosy** deals with the nature and sources of "natural drugs"-those obtained from plants or animals, either directly or indirectly. For example, with a drug such as quinine, this study involves the source, the commercial production, the marketing, the chief pure chemicals contained in the drug, and the uses made of the drug and its derivatives.
3. **Pharmacology** is concerned with understanding the action of drugs in the body. Attention is given to the effects of various doses of each medicinal substance and to the different ways in which medicine can be introduced into the body. The effects of poisons and the means to overcome them are studied in toxicology. Generally, animal tests are required to learn the strength of drugs. Physicians know a great deal about pharmacology and toxicology; yet, as the expert about drugs, the pharmacist must maintain this knowledge to an even greater extent.
4. **Business management** is important for graduates who plan to enter community pharmacy and some institutional practices. This area is commonly designated pharmacy administration. Instruction frequently includes principles of basic economics, accounting, management, computer applications, marketing, merchandising, and legal phases of the profession of pharmacy. Courses in pharmacy administration are especially helpful to pharmacists who become executives in pharmacies, hospitals, service wholesale houses, or manufacturing.
5. **Pharmacy practice** is offered in a variety of courses by colleges of pharmacy. These courses are designed to give an appreciation of the background and nature of the profession, to familiarize students with the many skilled processes used in pharmacy, to introduce the various forms of medicines, and to teach them how to dispense medication accurately and skillfully. Instruction in pharmacy practice again emphasizes the fact that pharmacy blends science and technology, and that throughout the professional services of the pharmacist there is a continuous responsibility both to the patient and the physician. Instruction in the pharmaceutical sciences and in the professional areas (except for most of the administration courses) includes some laboratory work. This laboratory work is both traditional and clinical. Laboratory instruction explores various scientific phenomena, as well as studies the clinical application of the principles of pharmaceutical sciences. Pharmacy practice is that area within the pharmacy curriculum which deals with patient care, placing an emphasis on drug therapy. Pharmacy practice seeks to develop a patient-oriented attitude in the student. The education of pharmacists who are able to meet the needs of society can be attained only through a careful blending of theoretical course work and clinical experiences.
6. The **clinical component** of the pharmacy curriculum varies from school to school, however, the basic objectives are the same. Some of these objectives are
  - to develop students' communication skills for effective interaction with patients and with practitioners of other health professions,
  - to help students develop a patient awareness in the practice of pharmacy
  - to enable students to integrate the knowledge acquired in course work prior to clinical exposure, and to apply it to the solution of real problems, and
  - to develop students' awareness of their responsibility for monitoring the drugs taken by patients,
  - to help students become more aware of the general methods of diagnosis and patient care specifically related to drug therapy

## **Fields of Study in Pharmacy Education and Profession**

The profession of pharmacy blends science, technical art, and human relationships in a unique fashion. Basic to the science in pharmacy are contributions from four broad fields-mathematics, physics, chemistry, and biology so courses in these basic sciences are required in pharmacy curricula.

**Mathematics** is an important tool in most scientific courses, so two or more semesters of college

mathematics are usually required. In addition, a pharmacist uses math a great deal in dispensing prescriptions, in determining proper drug dosage levels, in preparing formulas of many types, in management procedures, and in certain chemical calculations. Hence, additional instruction is given in the various kinds of weights and measures used in pharmacy, in calculating doses of drugs given to persons of different ages and weights, in calculating the amount of material to use for a solution, and in many other operations.

**Physics and Chemistry** - Instruction in physics is usually given because the principles are basic to many pharmaceutical practices. In addition, physics has a close relationship to chemistry; both sciences are needed in order to understand the behavior and properties of matter. The fineness of powdered drugs, the transfer of heat, the behavior of gases, the formation and decay of radioactive isotope - these and other phenomena of pharmacy can be well understood only through knowledge of the principles of physics. The active ingredients of most medications are pure chemicals; so it is easy to see why a thorough knowledge of chemistry is important. From simple table salt to substances so complex that their formulas are not completely known, pharmacists are continually dealing with chemicals. They must know how to handle and store them, as some are dangerous; how to analyze them to determine their purity; and how to dissolve them, combine them, package them, and preserve them - as well as how chemical substances behave in the body. Small wonder then that pharmacy students study the principles of the common divisions of chemistry and finish off this study with several courses in pharmaceutical chemistry, where the principles of basic chemistry are applied in the study of medicinal products. Many drugs come from plants and animals.

**Biology** - Moreover, the practical use of nearly all medicinal substances is within, or upon, the bodies of humans or animals. Hence, the study of biological sciences, including anatomy, physiology, zoology and biochemistry, is important for building a strong foundation of knowledge of natural drugs and their actions within the body.

Courses in **English, psychology, and sociology** are usually given in the pre-professional years, but some may be scheduled throughout the curriculum. These social sciences provide the students with a better ability to understand and communicate with people, thereby enabling them to practice more effectively within society.

## **Post-Professional (Post-PharmD) Graduate Study**

**Residency** - After graduating from pharmacy school, an increasing number of students are seeking residency training in pharmacy practice. Over 400 pharmacy residency programs are offered in hospitals, community pharmacies, and some specialized facilities. These residency programs may be taken in general pharmacy practice, clinical pharmacy practice, or other specialty areas depending upon personal interests and specific career requirements. Completion of a pharmacy residency is sometimes a requirement for employment in hospital pharmacy practice or as clinical faculties at pharmacy schools.

**Graduate Study** - Students also have the opportunity to complete advanced study. Graduate study in one of the pharmaceutical sciences may qualify the student for a Master of Science (M.S.), or doctor of philosophy (Ph.D.) degree. These advanced degree programs require an undergraduate degree at least at the bachelor's level prior to enrollment; however, the undergraduate degree need not be in pharmacy. The M.S. and Ph.D. degrees are research degrees and do not qualify the student to be a licensed pharmacy practitioner, unless the student has also earned a B.S. in Pharmacy (program no longer offered) or Pharm.D. degree.