The School of Pharmacy was established officially in 1898; the University College of Medicine had a school of pharmacy when it opened in 1893. The two-year curriculum gave way to a three-year program in 1925, and in 1932 the school required four years of college work and a Bachelor of Science degree was awarded. In 1960, the program lengthened to a five-year course leading to a Bachelor of Science in Pharmacy degree. In 1975 authority was granted to offer the Doctor of Pharmacy degree, which was initially offered to a small number of students who already completed four or five years of the B.S. program. A six-year program leading to the Doctor of Pharmacy degree was adopted as the only professional offering by the school in 1995. The School of Pharmacy currently enrolls students in a four-year professional Doctor of Pharmacy program curriculum following completion of at least 52 credits of pre-professional studies taken at VCU or elsewhere. The Doctor of Pharmacy degree program includes classroom instruction, practice laboratory instruction, as well as introductory and advanced pharmacy practice experiences.

The authority to award graduate degrees in the pharmaceutical sciences was granted by the Graduate Council in 1952. Departments in the school have the responsibility for administering a graduate program leading to the M.S. and Ph.D. in Pharmaceutical Sciences. This program includes areas of specialization in medicinal chemistry, pharmaceutics, pharmacotherapy and pharmacy administration. In 2020, the School of Pharmacy in partnership with the College of Engineering first initiated a Ph.D. degree in pharmaceutical engineering. These programs provide the preparation and research experience for academic, governmental and industrial careers. Graduate degrees in pharmaceutical sciences do not provide eligibility for licensure as a pharmacist.