PHARMACEUTICAL SCIENCES, DOCTOR OF PHILOSOPHY (PH.D.) WITH A CONCENTRATION IN MEDICINAL CHEMISTRY

Program goal

The School of Pharmacy offers the highest quality of graduate training in pharmaceutical sciences research and mentorship at the doctoral level.

Student learning outcomes

1. **Knowledge of research in pharmaceutical sciences**
   The candidate should demonstrate a general knowledge of the elements of the pharmaceutical sciences and a detailed knowledge of his/her area of research, including an appropriate familiarity with the research literature, policies and procedures, and methodology pertaining to their field.
2. **Design experiments in pharmaceutical sciences**
   The candidate should demonstrate an appropriate level of skill in the design of experimental protocols and the technical conduct of experimentation related to his/her research.
3. **Demonstrate appropriate communication skills**
   The candidate should demonstrate that an appropriate level of oral, written and visual communication skill has been acquired.
4. **Identify problems in pharmaceutical sciences**
   The candidate should demonstrate an appropriate level of skill in the identification of meaningful problems in the pharmaceutical sciences and the design of and implementation of appropriate problem-solving methods.
5. **General Knowledge in Medicinal Chemistry**
   The candidate should demonstrate an advanced knowledge in applying chemical (i.e., synthetic analytical, theoretical, and/or physical) principles to investigations of biologically active substances that include therapeutically useful drugs, natural products, toxins, and drugs of abuse. The candidate should demonstrate understanding of both the chemical and biological processes involved. In addition to a solid background in chemistry, the medicinal chemist is required to be versed in biological sciences (e.g., biochemistry, pharmacology, toxicology, molecular biology, enzyme mechanisms, receptor theory and/or neurochemistry) depending upon their particular research area.
6. **Research in Medicinal Chemistry**
   Investigations may be focused on identification of biological mechanisms of action, rational drug design and synthesis, metabolism studies, identification of pharmacological tools, or the development of techniques necessary to perform such studies. The candidate should demonstrate an advanced level of skill in the design of experimental protocols, the assays and tools to conduct the research, and the analysis of the data as well as interpretation of the results in medicinal chemistry, with an emphasis on their particular research area (e.g., cancer, cardiovascular disease, or neuroscience).
7. **Problem-solving in Medicinal Chemistry**
   The candidate should demonstrate an advanced level of skill in the identification of meaningful problems in medicinal chemistry as well as the design of and implementation of appropriate problem-solving methods in the field.
8. **Communication Skills in Medicinal Chemistry**
   The candidate should demonstrate that an advanced level of oral, written, and visual communication skills in medicinal chemistry have been acquired.

VCU Graduate Bulletin, VCU Graduate School and general academic policies and regulations for all graduate students in all graduate programs

The VCU Graduate Bulletin website documents the official admission and academic rules and regulations that govern graduate education for all graduate programs at the university. These policies are established by the graduate faculty of the university through their elected representatives to the University Graduate Council.

It is the responsibility of all graduate students, both on- and off-campus, to be familiar with the VCU Graduate Bulletin as well as the Graduate School website (http://www.graduate.vcu.edu/) and academic regulations in individual school and department publications and on program websites. However, in all cases, the official policies and procedures of the University Graduate Council, as published on the VCU Graduate Bulletin and Graduate School websites, take precedence over individual program policies and guidelines.

Visit the academic regulations section for additional information on academic regulations for graduate students. (https://bulletin.vcu.edu/academic-regs/)

Degree candidacy requirements

A graduate student admitted to a program or concentration requiring a final research project, work of art, thesis or dissertation, must qualify for continuing master's or doctoral status according to the degree candidacy requirements of the student's graduate program. Admission to degree candidacy, if applicable, is a formal statement by the graduate student's faculty regarding the student's academic achievements and the student's readiness to proceed to the final research phase of the degree program.

Graduate students and program directors should refer to the following degree candidacy policy as published in the VCU Graduate Bulletin for complete information and instructions.

Visit the academic regulations section for additional information on degree candidacy requirements. (https://bulletin.vcu.edu/academic-regs/grad/candidacy/)

Graduation requirements

As graduate students approach the end of their academic programs and the final semester of matriculation, they must make formal application to graduate. No degrees will be conferred until the application to graduate has been finalized.

Graduate students and program directors should refer to the following graduation requirements as published in the Graduate Bulletin for a complete list of instructions and a graduation checklist.

Visit the academic regulations section for additional information on graduation requirements. (https://bulletin.vcu.edu/academic-regs/grad/graduation-info/)

Other information

Current graduate students (https://pharmacy.vcu.edu/admissions/graduate/students/) may visit the school's website for additional resources, and prospective students (https://pharmacy.vcu.edu/admissions/graduate/) may apply online.

Apply online today. (https://www.vcu.edu/admissions/apply/graduate/)

Admission requirements

Degree:	Semester(s) of entry:	Deadline dates:	Test requirements:
Ph.D.	Fall	May 1 (Feb 1 for consideration for school funding)	GRE (optional); TOEFL (international applicants)

Special requirements

- Pharm.D. or bachelor's degree in a related area

In addition to the general admission requirements of the VCU Graduate School (https://bulletin.vcu.edu/graduate/study/admission-graduate-study/admission-requirements/), applicants must have received a baccalaureate from an accredited institution in a related area, demonstrating the ability to perform at the graduate level. Prerequisite and foundation course work may be required, depending upon the applicant's discipline.

Degree requirements

In addition to general VCU Graduate School graduation requirements (https://bulletin.vcu.edu/academic-regs/grad/graduation-info/), Ph.D. students in pharmaceutical sciences must complete a minimum of 30 graduate credit hours beyond the master's degree of required (both school and department core) and elective hours. All Ph.D. students must pass the comprehensive exam in each department in order to advance to candidacy. The exam consists of a written and oral component and is administered by either the student advisory committee (oral and written) and/or department faculty (written), depending on which option the student chooses. All Ph.D. students must pass the dissertation review and defense in each department in order to graduate.

In addition to the pharmaceutical sciences core courses, students must fulfill course and other degree requirements in their respective concentrations as outlined below. Students are required to complete a dissertation. The 30 credit-hour minimum directed research requirement may be waived for circumstances such as a prior M.S. degree. If waived, students must still complete the minimum number of hours required for the degree.

Curriculum requirements

Course	Title	Hours
Program core		
OVPR 601	Scientific Integrity	1
or OVPR 602	Responsible Scientific Conduct	
or OVPR 603	Responsible Conduct of Research	
PSCI 607	Introduction to Pharmaceutical Sciences From Bench to Shelf	2
PSCI 614	Research Techniques	1-4
PSCI 690	Seminars in the Pharmaceutical Sciences (one credit per semester)	1
Concentration courses		
IBMS 600	Laboratory Safety	1
MEDC 551	Analytical and Physical Pharmaceutical Chemistry	3
MEDC 552	Organic and Biochemical Pharmaceutical Chemistry	3
MEDC 555	Fundamentals of Drug Discovery I	3
MEDC 556	Fundamentals of Drug Discovery II	3.5
or MEDC 541	Survey of Molecular Modeling Methods	
MEDC 601	Advanced Medicinal Chemistry I	2.5
Electives		
Select a minimum of six credit hours (recommended for Ph.D.) [1]		6
Research		
MEDC 697	Directed Research in Medicinal Chemistry	1-15
or PSCI 701	Post-candidacy Doctoral Research	
Total Hours		**60**

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The elective courses taken will generally be selected from a list identified by the major adviser and will be agreed upon by the major adviser and student. These electives may include courses outside the department.

The minimum number of graduate credit hours required for this degree is 60.

Students who complete the requirements for this concentration will receive a Doctor of Philosophy in Pharmaceutical Sciences.

Contact

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School of Pharmacy graduate programs admissions coordinator
Current students: PharmGrad@vcu.edu
Prospective students: PharmSciAdmit@vcu.edu

Program website: pharmacy.vcu.edu (http://www.pharmacy.vcu.edu/)