PHARMACOLOGY AND TOXICOLOGY, DOCTOR OF PHILOSOPHY (PH.D.)

Program goal

The Ph.D. program is designed to provide students with the skills required to advance to positions as bioscience researchers and trainers in a broad spectrum of positions. The structure of the program provides a framework for the progressive development of a mastery of the current state of the subject matter of bioscience, an ability to synthesize this information and apply this foundation to the identification of key areas of investigation and experimentation in bioscience. The program relates this framework to the development of the ability to design, implement and interpret experimental approaches that address the questions identified. In addition, the program will develop skills in the various means of communicating both the core of bioscience knowledge and the expression of experimental design, results and interpretation to a variety of potential audiences.

Student learning outcomes

1. Oral communication skills: The candidate will demonstrate the achievement of an appropriate level of oral communication skills with respect to the content, organization, logical flow, presentation and appropriate use of language incorporating the use of visual aids, as measured by rubric.

2. Written communication skills: The candidate will demonstrate the achievement of an appropriate level of written communication skill with respect to grammar, syntax, spelling and use of vocabulary to effectively present information including the use of figures, tables and citations as measured by rubric.

3. Experimental design: The candidate will demonstrate the achievement of an appropriate level of competence in the ability to appraise, modify and/or create, and implement experimental protocols and to design and develop experiments as measured by rubric.

4. Problem-solving skills: The candidate will demonstrate an appropriate level of skill in the identification and selection of meaningful problems to be addressed in bioscience research, including the ability to defend said identifications and to design and develop appropriate methods to solve said problems as measured by rubric.

5. General knowledge of science: The candidate should demonstrate a general knowledge of the elements of the sciences as related to molecular/cellular bioscience and a detailed knowledge of his or her area of research, including an appropriate familiarity with the research literature.

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. (http://bulletin.vcu.edu/academic-reg/) Academic regulations for graduate students.

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. (http://bulletin.vcu.edu/academic-reg/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. (http://bulletin.vcu.edu/academic-reg/grad/graduation-info/)

Other information

Students wishing to matriculate into the Department of Pharmacology and Toxicology can contact the program director for further advice on course requirements and advising.

School of Medicine graduate program policies

The School of Medicine provides policies applicable to all programs administratively housed in the school. Information on doctoral programs is available elsewhere in this chapter of the Graduate Bulletin.

Apply online at graduate.admissions.vcu.edu (http://wwwgraduate.admissions.vcu.edu).
Participation in research also is begun early in the first year. Students work in pharmacology and biochemistry during the first year of study. The broad base offered in the PhD. program in pharmacology and toxicology together with basic training in physiology and biochemistry, provides the background for a successful career in academic institutions, industry or government. The research program of the department is sufficiently broad to provide an adequate basis for entry into a wide variety of interesting areas of modern biology and medicine.

In addition to the general VCU Graduate School graduation requirements (http://bulletin.vcu.edu/academic-regs/grad/graduation-info/), students must complete a minimum of 60 graduate credit hours. With few exceptions, Ph.D. students are enrolled in the Biomedical Sciences Doctoral Portal from matriculation until matched with an adviser, usually by the summer semester of the second year. The students are moved into the Ph.D. in Pharmacology and Toxicology major after meeting program requirements. Students customarily complete formal course work in pharmacology and biochemistry during the first year of study. Participation in research also is begun early in the first year. Students interested or committed to pharmacology should take the footnoted (1) courses listed in the curriculum requirements section during the portal period to assure rapid progress toward the degree.

In the third and subsequent years, the majority of the course load is taken as PHTX 697. Advanced electives also may be taken as desired and with the approval of the adviser. Students and faculty participate in a seminar program (PHTX 690) that includes distinguished visiting scientists from the U.S. and abroad. Following completion of a qualifying examination, a degree candidate is required to submit and defend a thesis embracing an original research project conducted under the guidance and supervision of an adviser and an advisory committee. There is no foreign language requirement. The average time necessary to complete the doctoral program in pharmacology and toxicology is four to five years.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGRB 603</td>
<td>Biomedical Signal Processing</td>
</tr>
<tr>
<td>EGRB 610</td>
<td>Microprocessor Interfacing for Biomedical Instrumentation</td>
</tr>
<tr>
<td>IBMS 635</td>
<td>Cellular Signalling</td>
</tr>
<tr>
<td>MEDC 541</td>
<td>Survey of Molecular Modeling Methods</td>
</tr>
<tr>
<td>MEDC 601</td>
<td>Advanced Medicinal Chemistry I</td>
</tr>
<tr>
<td>MEDC 630</td>
<td>Theoretical Methods in Drug Design</td>
</tr>
<tr>
<td>MICR 505</td>
<td>Immunobiology</td>
</tr>
<tr>
<td>MICR/BINFO 653</td>
<td>Advanced Molecular Genetics: Bioinformatics</td>
</tr>
<tr>
<td>NEUS 609</td>
<td>Cellular and Molecular Neuroscience</td>
</tr>
<tr>
<td>PHIS 501</td>
<td>Mammalian Physiology</td>
</tr>
<tr>
<td>PHIS 604</td>
<td>Cell Physiology: Cardiovascular and Respiratory</td>
</tr>
<tr>
<td>PHIS 615</td>
<td>Signal Detection in Sensory Systems</td>
</tr>
<tr>
<td>PHTX 632</td>
<td>Neurochemical Pharmacology</td>
</tr>
<tr>
<td>PHTX 633</td>
<td>Behavioral Pharmacology</td>
</tr>
<tr>
<td>PHTX/FRSC 644</td>
<td>Forensic Toxicology</td>
</tr>
<tr>
<td>PHTX 697</td>
<td>Directed Research in Pharmacology (variable credits)</td>
</tr>
</tbody>
</table>

Total Hours 42

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

Typical plan of study
Many students often end up taking more than the minimum number of hours required for a degree program. The total number of hours may vary depending upon the program, nature of research being conducted by a study or in the enrollment or funding status of the student. Students should refer to their program websites and talk with their graduate program directors or advisers for information about typical plans of study and registration requirements.

Graduate program director
Krista L. Scoggins, D.V.M.
Director, graduate education, Department of Pharmacology and Toxicology
krista.scoggins@vcuhealth.org
(804) 828-7918

Additional contact
Sheryol W. Cox
Coordinator, graduate programs in pharmacology and toxicology
sheryol.cox@vcuhealth.org
(804) 828-8400

Program website: pharmtox.vcu.edu (https://pharmtox.vcu.edu/)