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

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.

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.pharmacy.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.

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.

Other information
School of Pharmacy policies and procedures for graduate students (http://www.pharmacy.vcu.edu/programs/pharmd/current/statements_and_policies)
Website for current students: pharmacy.vcu.edu/programs/graduate/current-students
Website for prospective students: pharmacy.vcu.edu/programs/graduate/prospective-students

Apply online at graduate.admissions.vcu.edu (http://www.graduate.admissions.vcu.edu).

Admission requirements

<table>
<thead>
<tr>
<th>Degree:</th>
<th>Semester(s) of entry:</th>
<th>Deadline dates:</th>
<th>Test requirements:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D.</td>
<td>Fall</td>
<td>May 1 (priority consideration for financial aid Feb 1)</td>
<td>GRE, TOEFL (international applicants)</td>
</tr>
</tbody>
</table>

Special requirements
- Pharm.D. or bachelor’s degree in a related area

In addition to the general admission requirements of the VCU Graduate School (http://bulletin.vcu.edu/academic-regs/grad/candidacy), 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 (http://bulletin.vcu.edu/academic-reg/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.

All School of Pharmacy graduate students must fulfill curricular requirements of the School of Pharmacy core curriculum and the core curriculum required by their respective options. Course work taken as part of a master's degree program may be waived; however, students must replace those courses with additional course work or directed research to meet the minimum 30 credit hour requirement for the Ph.D.

**Curriculum requirements**

**Prerequisites**

All students should have prerequisite knowledge in chemistry, mathematics and biology. The following departmental courses or their equivalents are required for admission into the Department of Pharmaceutics option. If a prospective student has not met any of the prerequisites, the course(s) may be included in the student's core course requirements upon recommendation by the prospective graduate adviser and approval by the respective course coordinator (see below).

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**Course** | **Title** | **Hours**
--- | --- | ---
CHEM 409 & CHEZ 409 | Instrumental Analysis and Instrumental Analysis Laboratory ¹ | 5
PCEU 508 | Pharmacokinetics | 3
PCEU 509 | Pharmaceutics and Biopharmaceutics II | 3

¹ Undergraduate prerequisite course work may not count toward the minimum 30 graduate credit hours required for the degree and may not be included in the calculation of graduate statistics, i.e., GPA, 20 percent C or below rule, etc.

**School of Pharmacy core curriculum**

**Course** | **Title** | **Hours**
--- | --- | ---
BIOS 543 or STAT 543 | Graduate Research Methods I | 3
MEDC 541 | Survey of Molecular Modeling Methods (1 credit repeated) | 3
MEDC 601 | Advanced Medicinal Chemistry I (1 credit repeated) | 3
IBMS 600 | Laboratory Safety (or equivalent) | 1
OVPR 601 | Scientific Integrity (or equivalent) | 1
PCEU/MEDC/PHAR 614 | Research Techniques (variable credit) | 1

**Select a minimum of one credit from the following:**

<table>
<thead>
<tr>
<th><strong>Course</strong></th>
<th><strong>Title</strong></th>
<th><strong>Hours</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>PCEU 590</td>
<td>Biopharmaceutics</td>
<td>2</td>
</tr>
<tr>
<td>MEDC 526</td>
<td>Research Techniques in Medicinal Chemistry (variable credit)</td>
<td>1</td>
</tr>
<tr>
<td>Select a minimum of one credit from the following:</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PCEU 690</td>
<td>Pharmaceutics Research Seminar (variable credit)</td>
<td>1</td>
</tr>
<tr>
<td>MEDC 690</td>
<td>Departmental Research Seminar (variable credit)</td>
<td>1</td>
</tr>
<tr>
<td>PHAR 690</td>
<td>Pharmacy Research Seminar (variable credit)</td>
<td>1</td>
</tr>
<tr>
<td>PSCI 607 &amp; PSCI 608</td>
<td>Introduction to Pharmaceutical Sciences From Bench to Shelf</td>
<td>2</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

In addition to the pharmaceutical sciences core courses, students must fulfill course and other degree requirements in their respective concentrations as outlined below.

**Concentration**

<table>
<thead>
<tr>
<th><strong>Course</strong></th>
<th><strong>Title</strong></th>
<th><strong>Hours</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS 543 or STAT 543</td>
<td>Graduate Research Methods I</td>
<td>3</td>
</tr>
<tr>
<td>PCEU 612</td>
<td>Advanced Physical Pharmacy and Biopharmaceutics</td>
<td>3</td>
</tr>
<tr>
<td>PCEU 625</td>
<td>Pharmaceutical Analysis</td>
<td>2</td>
</tr>
<tr>
<td>PCEU 690</td>
<td>Pharmaceutics Research Seminar</td>
<td>1</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

**Electives**

<table>
<thead>
<tr>
<th><strong>Course</strong></th>
<th><strong>Title</strong></th>
<th><strong>Hours</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electives (see details below)</td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

In addition to the core curriculum above, Ph.D. students will be encouraged but not required to take elective courses. A minimum 12 elective credit hours are recommended for the Ph.D. These courses will be selected based upon individual research program needs and will be chosen through mutual consultation with the student and major adviser.

**Research**

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 minimum number of hours required for the degree.

<table>
<thead>
<tr>
<th><strong>Course</strong></th>
<th><strong>Title</strong></th>
<th><strong>Hours</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>PCEU 697</td>
<td>Directed Research in Pharmaceutics (variable credit)</td>
<td>30</td>
</tr>
</tbody>
</table>

**Total graduate credit hours required (minimum) 60**

**Graduate program director**

Aron Lichtman, Ph.D.

Associate dean for research and graduate studies

Email: alichtma@vcu.edu

Phone: (804) 628-5233

**Additional contact**

Shakim Jackson

Education coordinator
Email: sjackson29@vcu.edu
Phone: (804) 628-4408

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