MICROBIOLOGY AND IMMUNOLOGY, DOCTOR OF PHILOSOPHY (PH.D.)

Program goal

The graduate programs of the Department of Microbiology and Immunology in the School of Medicine include degrees offered at the master's and doctoral levels. These educational programs have as their mission the preparation of individuals for a variety of career objectives in microbiology and immunology. The programs incorporate formal instructional activities and, as appropriate, research training, mentored by the members of the faculty.

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.

The Ph.D. program is also designed to 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. (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

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

Admission requirements

Degree:	Semester(s) of entry:	Deadline dates:	Test requirements:
Ph.D.	Fall	Dec 1 of the year before matriculation	TOEFL if international

Special requirements

- Applications for the program must be submitted to the Biomedical Sciences Doctoral Portal – School of Medicine – Ph.D. selected from the drop-down menu of programs on the VCU online application form.
- Applications to the BSDP should be completed (i.e. receipt of all forms, letters, transcripts, etc.) by Dec. 1 of the year before matriculation. Applications completed after this date will be reviewed only as remaining spaces permit.

In addition to the general admission requirements of the VCU Graduate School (https://bulletin.vcu.edu/graduate/study/admission-graduate-study/admission-requirements/), successful applicants will typically have the following credentials:

1. A baccalaureate degree or its equivalent at the time of enrollment, with an undergraduate GPA of 3.5.
2. TOEFL scores of 600 (pBT), 250 (cBT) or 100 (iBT) for individuals for whom English is a second language; or 6.5 on the IELTS (To report GRE or TOEFL score, use VCU Code 5570).
3. Personal statements, which should include: long-term career goals to assess reasons behind the candidate's application; how a Ph.D. in biomedical science helps achieve those goals; the factors motivating a career in research; research experience, including dates, places and duration.
4. Three letters of recommendation that speak to the scientific competency and experience of the applicant.
5. The equivalent of two semesters of general chemistry, two semesters of organic chemistry and two semesters of upper-level biology courses (e.g. cell biology, molecular biology, biochemistry, genetics, neuroscience, physiology, biophysics, etc.).

Degree requirements

In addition to the general VCU Graduate School graduation requirements (https://bulletin.vcu.edu/academic-regs/grad/graduation-info/), students must complete a minimum of 58 graduate credit hours.

The Department of Microbiology and Immunology has an outstanding faculty with diverse research interests that include cell and molecular biology, molecular genetics, molecular pathogenesis, bacteriology, immunology, immunotoxicology, virology, parasitology, mycology and oncology. The goal of the graduate program is to prepare students to become creative problem-solvers and leaders in scientific research. The Ph.D. degree is offered, as well as an M.D.-Ph.D. option for medical students interested in academic or research careers, and a master's degree.

The research experience is complemented with excellent course offerings, seminar programs, teaching opportunities, presentations at scientific meetings, writing of a grant application and writing of scientific papers. Graduate students acquire a wide range of research experience in the first year through exposure to a variety of research laboratories and investigators. The student matches with a research adviser, completes a written and oral examination and then carries out an original independent research project under the direction of the adviser. The project falls under the review of a graduate advisory committee, and a written dissertation is defended in a final examination.

A cumulative GPA of 3.0 (with no more than six credit hours of a C grade) is required to maintain satisfactory academic progress.

Course requirements

Course	Title	Hours
Required core courses		
IBMS 600	Laboratory Safety	1
IBMS 621	Laboratory Rotation I	2
IBMS 622	Laboratory Rotation II	2
IBMS 623	Laboratory Rotation III	2
MICR 505	Immunobiology	3
MICR 515	Principles of Molecular Microbiology	3
MICR 690	Microbiology Research Seminar (taken each fall and spring semester; minimum eight credits)	8
Required additional courses		
Select at least one of the following:		3
MICR 605	Prokaryotic Molecular Genetics	
MICR 616	Mechanisms of Viral and Parasite Pathogenesis [1]	
MICR 618	Molecular Mechanisms of Microbial Pathogenesis [1]	
MICR 686	Advanced Immunobiology [2]	
Select one of the following journal club courses for one semester every year (four credits minimum).		4
MICR 692	Current Topics in Molecular Pathogenesis	
MICR 694	Current Topics in Immunology	
OVPR 601	Scientific Integrity	1
or OVPR 602	Responsible Scientific Conduct	
or OVPR 603	Responsible Conduct of Research	
Elective courses		
Select at least two credits from the following:		2
ANAT 620	Scientific Writing and Grantsmanship	
IBMS 635	Cellular Signalling	
MICR 607	Techniques in Molecular Biology and Genetics	
MICR 684	Molecular Biology & Pharmacology of Cancer	
MICR 691	Special Topics in Microbiology	
Dissertation research		
MICR 697	Directed Research in Microbiology	27
Total Hours		**58**

1 Offered in alternate years

2

May be repeated with different content.

The minimum number of graduate credit hours required for this degree is 58.

Students who complete the requirements for this degree will receive a Doctor of Philosophy in Microbiology and Immunology.

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.

M.D.-Ph.D. opportunity

The M.D.-Ph.D. program allows students to pursue both the M.D. and Ph.D. degrees using a coordinated program of study and apply a limited number of M.D. requirements toward fulfillment of requirements for the Ph.D. See the dual degree program page (https://bulletin.vcu.edu/graduate/dual-degree-opps/md-microimm-phd/) for additional details.

Contact for prospective students
Kimberly Jefferson, Ph.D.
Associate professor, Department of Microbiology and Immunology
kimberly.jefferson@vcuhealth.org
(804) 828-9699

Contact for current students
Lisa Shock, Ph.D.
Assistant professor, Department of Microbiology and Immunology
lisa.shock@vcuhealth.org
(804) 628-2289

Additional contact
Martha L. VanMeter
Office services specialist
martha.vanmeter@vcuhealth.org
(804) 828-9728

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