

# MICROBIOLOGY (PHD)

## Overview

The Graduate Program in Microbiology at the University of Colorado Anschutz Medical Campus is a Ph.D. program that prepares students to contribute to an understanding of microbial species, including archaea, bacteria, fungi, helminths, protozoa, and viruses, and their positive and negative roles in the health of humans. Despite progress and breakthroughs in public health, vaccination, therapeutics, and antibiotics, there are many ongoing and emerging challenges in the prevention and treatment of infectious disease. As we continue to learn about the complex populations of organisms that surround us and colonize us, rigorous training of future young investigators in microbiology will continue to be essential to human health. The principle aim of the Graduate Program in Microbiology is to help produce the next generation of microbiologists to address unsolved and arising questions in basic and translational microbiology research.

The Graduate Program in Microbiology provides advanced training and education for students with the desire and ability to thrive in a stimulating, research-oriented graduate program leading to careers in science in the academic, governmental, or private sectors. Close individual attention is given by the faculty to the needs and training of each graduate student. The Microbiology Program faculty includes members of the Departments of Immunology and Microbiology, Medicine, Neurology, Pediatrics, and Biochemistry and Molecular Genetics. Faculty research interests include molecular mechanisms of bacterial and viral pathogenesis, the molecular biology of microbial gene expression, pathogen-host interactions, innate and adaptive immune responses to infection, mechanisms of immune evasion, the role of the microbiome in health and disease, structural biology, and development of novel therapeutics and vaccines.

## Admissions Requirements

### Admissions Philosophy

The Graduate Program in Microbiology seeks students with the intellectual aptitude, independence, and motivation to pursue scientific research. Students are considered and selected on the basis of past academic performance, previous laboratory research experience, recommendations, and individual interviews. While previous experience in Microbiology coursework and research is helpful, the Graduate Program in Microbiology welcomes applicants with varied backgrounds. Students most likely to succeed have traditionally been those with intellectual achievement and creativity, first-hand understanding of laboratory research, and a strong personal desire and motivation to progress in their scientific training.

There are 3 ways to enter the Microbiology Program:

- Apply directly to the Microbiology Graduate Program.
- Apply to the Biomedical Sciences Umbrella Program and join the Microbiology Graduate Program after your 1st year.
- Those interested in pursuing an MD/PhD with research interests in Microbiology may apply to the Medical Scientist Training Program and complete their PhD portion through Microbiology. Note: the MSTP follows a separate application process with different deadlines.

The Graduate Program in Microbiology also works closely with the Immunology Program and the Molecular Biology graduate programs, and

several labs have joint appointments which can allow for a student to rotate and/or complete thesis work in a Microbiology lab.

## Entrance Requirements

**Undergraduate Studies** | The Graduate Program in Microbiology requires a baccalaureate degree (BS or BA) with a 3.0 (out of 4.0) Grade Point Average (GPA), although exceptions can be considered. Admissions Committee reviews completed coursework to determine if each applicant has sufficient background to pursue our doctoral degree. Specific courses are not required, but coursework in the following subjects is recommended and can enhance an application: Microbiology, Immunology, Virology, Organic Chemistry, Biology, Biochemistry, Cell Biology, Genetics, Molecular Biology, Molecular Genetics, and Physiology.

**Research Experience** | Research experience, particularly experimental, hypothesis-driven research experience, is highly recommended. This type of experience is extremely valuable in providing insight to both the Admissions Committee and the candidate as to their commitment to the rigors and rewards of scientific endeavor.

**Letters of Recommendation** | Three (3) letters of recommendation are required for an application to be considered complete, and thus be reviewed by the Microbiology Admissions Committee. These letters are important and are a critical element for the Admissions Committee's evaluation of applications. Thus, when possible, applicants should select faculty research mentors that can discuss academic performance, research experience, and the likelihood of the applicant's future success as a scientist.

### DEADLINE FOR APPLICATIONS IS DECEMBER 1st.

Applications will open September 1, and all application and supplemental materials are due no later than December 1. Applications received after December 1 may not be considered.

To apply for admission applicants must submit the following:

- **Online Graduate School application**
- A \$50.00 domestic and \$75.00 international non-refundable application fee.
- One (1) official transcript of all academic work completed to date. To be considered "official", the transcripts must come directly from the issuing institution.

Electronic Transcripts should be sent to [graduateadmissions@ucdenver.edu](mailto:graduateadmissions@ucdenver.edu)

OR

Mail a physical copy to:

University of Colorado Denver  
Graduate School  
Campus Box 163  
PO Box 173364  
1380 Lawrence Street Suite 1250  
Denver, CO 80205-3364

- Three (3) letters of recommendation. Letters should be from individuals such as college professors or faculty mentors who are familiar with your academic and/or laboratory achievements. Such letters should be submitted electronically through the on-line application.
- GRE scores are no longer required for admission.

- International Applicants only: Students whose native language is not English or who have completed their studies at an institution where English was not the language of instruction, must demonstrate English language proficiency by submitting scores of the Test of English as a Foreign Language (TOEFL) or its equivalent. Visit International Admissions for more information.

## Degree Requirements

### First Year

Course	Title	Hours
<b>Year 1</b>		
<b>Fall</b>		
BMSC 7806	Core I: Foundations in Biomedical Sciences	6
BMSC 7810	Core Topics in Biomedical Science <sup>Topic A:</sup> Microbiology in Biomedical Research	2
MICB 7650	Research in Microbiology <sup>Section 001</sup>	1
MICB 7650	Research in Microbiology <sup>Section 001</sup>	1
Choose 1 of the following:		
BMSC 7810	Core Topics in Biomedical Science <sup>Topic</sup> B:The Microbiome in Health and Medicine	2
BMSC 7810	Core Topics in Biomedical Science <sup>Topic B:</sup> Gene Regulation and RNA Biology in Disease	2
BMSC 7810	Core Topics in Biomedical Science <sup>Topic B:</sup> Principles of Cancer Biology	2
Hours		16
<b>Spring</b>		
MICB 7650	Research in Microbiology	1
MICB 7703	Molecular Mechanisms of Bacterial Disease	3
MICB 7701	Molecular Virology and Pathogenesis	3
Hours		7
<b>Summer</b>		
MICB 8990	Doctoral Thesis	1
Hours		1
Total Hours		24

### Second Year

Course	Title	Hours
<b>Year 2</b>		
<b>Fall</b>		
MICB 7650	Research in Microbiology <sup>Section 0V3</sup>	1-10
IMMU 7607	Science as a Profession	1
Hours		2-11
<b>Spring</b>		
MICB 7650	Research in Microbiology <sup>Section 0V3</sup>	5
IMMU 7605	Workshop in Scientific Writing	1
Hours		6
<b>Summer</b>		
MICB 8990	Doctoral Thesis	1
Hours		1
Total Hours		9-18

## Learning Objectives

The PhD program in Microbiology trains graduate students to become proficient and successful investigators who are able to:

- Demonstrate a basic knowledge of central concepts in the biomedical sciences.
- Understand current concepts in microbiology.
- Read and critically evaluate the scientific literature.
- Formulate hypotheses based on current concepts in the field and design, conduct, and interpret their own research projects.
- Present research results in peer-reviewed publications and in a dissertation.
- Communicate research results effectively through oral presentations at scientific seminars, conferences, and other venues.
- Write a competitive application for research funding.
- Develop ancillary skills, where necessary, to obtain positions outside of academic research.

## Courses

**BMSC 7806 - Core I: Foundations in Biomedical Sciences (6 Credits)**  
Course will focus on the fundamental principles of biomedical sciences. Lectures and recitations/discussions will primarily address the basics of molecular biology, biochemistry, genetics, cell biology and energetic principles. Course is typically limited to biomedical science PhD and BSBT MS students. Previously offered as IDPT 7806

Grading Basis: Letter Grade

Repeatable. Max Credits: 6.

Typically Offered: Fall.

**BMSC 7810 - Core Topics in Biomedical Science (1-6 Credits)**

Sections focus on different core topics in biomedical science, and will address subject areas such as protein structure and function, neurobiology, embryology, stem cell research, and cancer biology. Students can enroll in multiple Core Topic Courses topics in one semester. Previously offered as IDPT 7810.

Grading Basis: Letter Grade

Repeatable. Max Credits: 20.

AMC-PHD PhD Students only

Typically Offered: Fall.

**IMMU 7605 - Workshop in Scientific Writing (1 Credit)**

This workshop will consist of one session weekly for students to be critiqued on writing assignments designed to provide basic training in writing grant proposals and manuscripts.

Grading Basis: Letter Grade

Typically Offered: Spring.

**IMMU 7607 - Science as a Profession (1 Credit)**

This course discusses ethical issues, conflicts of interest, and regulations for working with humans or animals. It also includes instruction on writing papers and grants, giving effective presentations and advice on finding jobs in academia and industry.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Fall.

**MICB 7650 - Research in Microbiology (1-10 Credits)**

Research work in microbiology. Prereq: Consent of instructor.

Grading Basis: Letter Grade with IP

Repeatable. Max Credits: 99.

A-GRAD Restricted to graduate students only.

Typically Offered: Fall, Spring, Summer.

**MICB 7701 - Molecular Virology and Pathogenesis (3 Credits)**

Topics in this course include viral structure and genome organization, replication and expression of viral genomes, mechanism of action of tumor viruses, molecular aspects of virus-host cell interactions, animal models of infectious diseases and pathogenesis of human viruses.

Prereq: MICB 7706, MICB 7705 are desirable but not required. Restriction: Permission of Instructor.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

**MICB 7703 - Molecular Mechanisms of Bacterial Disease (3 Credits)**

The course focuses on molecular processes that bacteria utilize to cause disease in humans. The course content will use specific examples from pathogenic bacteria to illustrate common virulence mechanisms utilized to initiate, maintain and survive interactions with host cells. Prereq:

Recommended Fundamentals of Microbiology Restrictions: Permission of the instructor.

Grading Basis: Letter Grade

A-GRAD Restricted to graduate students only.

Typically Offered: Spring.

**MICB 8990 - Doctoral Thesis (1-10 Credits)**

Doctoral thesis work in microbiology. Prereq: Consent of the instructor.

Grading Basis: Letter Grade with IP

Repeatable. Max Credits: 99.

A-GRAD Restricted to graduate students only.

Additional Information: Report as Full Time.

Typically Offered: Fall, Spring, Summer.

**Microbiology Graduate Program**

**Mail Stop 8333**

**Research Complex 1 North**

**12800 E. 18th Ave., Rm. P18-9112**

**Aurora, Colorado 80045**

## Program Calendar

August – Department of Immunology & Microbiology Scientific Conference & Retreat

October – Immunology Program & Microbiology Program Student (only) Retreat

October – MPID T-32 Mini-symposium

Weekly – Research in Progress Seminar with the Immunology Program

Weekly- Infectious Disease Journal Club

Weekly – Speaker Series with Immunology Program

Twice per year – Student Invited Speaker Seminar and meetings

## Contact Us

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