



Department of Microbiology & Immunology Ph.D. Program

Our Department

A Passion For Education

The UNC Graduate School sets basic guidelines for the Ph.D. degree, but each department designs their own training program. Our faculty is passionate about graduate education, vigorously debates the best way to train scientists, and then commits their time to support the Ph.D. students. For example, in the MCRO795 writing class, each student receives 26 detailed critiques (two per week) of their writing assignments to facilitate improvement. This requires the participation of one faculty member for every two students in the course.

Areas Of Research Excellence

The Department of Microbiology & Immunology is organized into three research areas, although there is substantial overlap:

- **IMMUNOLOGY**, including B cells, dendritic cells, macrophages, T cells, T regulatory cells, autoimmunity, allergy, tolerance, transplantation, innate immunity, inflammation, infant immune system, burn injury, cancer, host/pathogen interactions, microbiome, immunotherapy, vaccines.
- **MICROBIAL INTERACTIONS**, including *Bacillus subtilis*, *Bordetella bronchiseptica*, *Bordetella pertusis*, *Burkholderia pseudomallei*, *Clostridioides difficile*, *Chlamydia trachomatis*, *Histoplasma capsulatum*, *Klebsiella pneumoniae*, *Mycobacterium smegmatis*, *Mycobacterium tuberculosis*, *Neisseria gonorrhoeae*, *Pseudomonas aeruginosa*, *Pseudomonas syringae*, *Staphylococcus aureus*, *Trichomonas vaginalis*, and *Vibrio cholerae*.
- **VIROLOGY**, including arboviruses, MERS, SARS and SARS2 corona viruses, Chikungunya virus, human cytomegalovirus, dengue virus, enteroviruses, Epstein-Barr virus, flaviviruses, hepatitis C virus, influenza virus, Kaposi's sarcoma herpes virus & other herpesviruses, lentiviruses, Norwalk virus, human & simian immunodeficiency viruses, human papilloma virus, respiratory syncytial virus, Ross River virus, and Zika virus.

Classroom Course Offerings

Lecture-based Courses

- MCRO614 - Immunobiology - Fall
- MCRO630 - Virology - Fall
- MCRO635 - Microbial Pathogenesis I (bacteria & fungi) - Fall
- MCRO640 - Microbial Pathogenesis II (viruses) - Spring

Scientific Literature Analysis

- MCRO710 - Seminar/Tutorial in Microbial Pathogenesis - Spring
- MCRO711 - Seminar/Tutorial in Virology - Fall
- MCRO712 - Seminar/Tutorial in Immunology - Fall, Spring

Due to topic changes, the same seminar/tutorial class can be taken for credit more than once.

Developing & Writing Research Proposals

- MCRO795 - Research Concepts (logic & writing) – Fall

Responsible Conduct of Research

- MCRO721 – Refresher Training – Fall of 5th year

Our Ph.D. Program

Degree Requirements

- **Six classroom courses**, two of which must be literature-based to learn critical reading/analysis skills. The MCRO795 writing/logic class is the only specifically required course, and provides preparation for the preliminary examinations as well as fellowship applications.
- **MCRO701 seminar course.** Every semester, students must attend at least two-thirds of our weekly departmental and student seminars to obtain broad exposure to modern microbiology and immunology research. Beginning in the third year, students present a seminar annually.
- **Written preliminary examination.** We want to test your ideas, not those of our faculty. Therefore, during the spring of the second year, students develop an original research topic that cannot be the subject of investigation in their laboratories. Topics are inspired by a list of papers selected by the faculty. Students write a seven page fellowship-style research proposal on their topic. Students are strongly encouraged to discuss their ideas with others, but cannot receive assistance with the actual writing of the proposal. Revisions are allowed.
- **Oral preliminary examination/project approval.** Students orally defend their thesis research proposal in the fall of the third year.
- **Teaching assistant.** Students serve two semesters as TA's in undergraduate microbiology classes.
- **Thesis committee.** Provide a progress report and meet with thesis committee annually.
- **Publications.** We *expect* students to complete sufficient original research for two first-author publications in quality journals. We *require* authorship on at least two manuscripts (at least one accepted for publication), with peer reviews returned for at least one first author research paper.
- **Ph.D. dissertation.** Write dissertation, defend in a private committee meeting, and present results in a public seminar.

Degree Progression

- **Year 1.** Take courses, do three laboratory rotations, and participate in BBSP first year groups and professional development activities, including research ethics training. Choose a research advisor and join the Department of Microbiology & Immunology.
- **Year 2.** Perform thesis research, finish classroom courses (including MCRO795 writing course in the fall), participate in MCRO701 seminar course, act as TA, and take written preliminary examination.
- **Year 3.** Perform thesis research, choose thesis committee and chair, take oral preliminary examination, obtain approval of thesis project, participate in MCRO701 seminar course, act as TA, and give student seminar. Outline papers for publication.
- **Years ≥ 4.** Perform thesis research, meet with thesis committee at least once per year, speak in student seminar series annually, and participate in MCRO701 seminar course. Write papers for publication.
- **Final Year.** Finish writing papers. Write dissertation, defend orally, and present public seminar. Our Ph.D. degree typically takes five to six years.

Our Research Community

People Are Our Most Important Resource

The Department of Microbiology & Immunology is composed of ~290 people, including:

- About 80 faculty members, split evenly between primary and joint appointments.
- About 70 laboratories are available to graduate students.
- About 60 Ph.D. and 3 M.S. students.
- About 40 postdoctoral scientists in primary labs and 60 in joint labs.
- About 35 research staff.
- About 10 administrative staff.

Building Collegiality & Collaboration

It is readily apparent that an atmosphere of collegiality and cooperation permeates the Department of Microbiology & Immunology. Examples abound of joint group meetings and publications between labs, single labs with multiple faculty members to contribute diverse expertise, graduate students with mentors from different labs, etc. Southern hospitality is alive and well - people go out of their way to help one another, starting with the example set by the departmental office staff.

Our student seminar series is a great way to keep track of what everyone is doing, and has a large audience each week. Graduate students who work in Microbiology & Immunology labs but are members of other Ph.D. programs (e.g. Biochemistry & Biophysics, Genetics & Molecular Biology,) can speak in the series so we can benefit from awareness of their research.

Other opportunities to interact with department members include a First Friday social hour hosted by different labs each month, an annual retreat, and an annual symposium featuring postdoctoral scientists in our department.

Research Talks

- Other opportunities to present and hear about research include:
- Immunology Journal Club/Research in Progress – monthly.
 - Virology Research In Progress – weekly.
 - Bacterial/Eukaryotic Pathogens Journal Club/Research In Progress – monthly.
 - Triangle Microbial Interactions - two to three times per year.
 - Virology T32 Colloquium - annually.
 - Immunology T32 Symposium – every other year.

Other Graduate Student Opportunities

- Students can arrange internships to explore various career options.
- TIBBS and the Graduate School offer many professional development activities
- Students with an approved thesis project can receive a one time travel award from our department toward the cost of attending a national/international meeting to present their results.
- The Microbiology & Immunology students organize and host the Bassford Memorial Lecture each year.
- Three student representatives serve on the Education and Training Committee, which considers how to improve the Ph.D. training program and other pertinent issues.
- Students elect two departmental representatives to the UNC Graduate & Professional Students Federation.