

# IMMUNOLOGY AND MICROBIOLOGY (PH.D.)

The Ph.D. program in Immunology and Microbiology educates and trains students for research careers in immunology, microbiology or virology. During the first year of the program, students take courses in cellular and molecular biology as part of the interdisciplinary biomedical sciences curriculum, as well as courses in immunology, microbiology, and virology. Participation in journal clubs, seminars and research rotations in faculty laboratories provide opportunities to become familiar with the faculty and other students. An oral preliminary examination is administered during the summer of the first year. Selection of a dissertation advisor typically occurs after the preliminary examination. Dissertation research begins at this time and continues through the remainder of the program. A dissertation advisory committee is formed by the end of the second year and thereafter meets regularly (at least once every 6 months) with the student to review research progress and course work related to the student's doctoral program. Students typically defend their dissertation near the end of their fifth year. The program also requires submission of a first author publication to a peer-reviewed journal.

Admission to these programs is contingent upon admission to the Graduate School (<http://bulletins.wayne.edu/graduate/general-information/admission/>) and the graduate programs of the School of Medicine (<http://bulletins.wayne.edu/graduate/school-medicine/programs/>).

## Year One:

The first year of the Ph.D. curriculum establishes the foundation for the remainder of a student's graduate development. During the Fall semester, students take IBS 7015 (Interdisciplinary Cell and Molecular Biology, 6 credits). Additionally, they enroll in IM 7040 (Fundamentals of Research, 2 credits), BMB 7890 (Journal Club, 1 credit), and IM 7140 (Critical Thinking, 1 credit), for a total of 10 credits.

During the Winter semester, students complete the Immunology and Microbiology fundamentals courses: IM 7010 (Fundamentals of Immunology), IM 7520 (Molecular Mechanisms of Bacterial Pathogenesis), and IM 7030 (Molecular Biology of Viruses). They also take one of the courses: IBS 7030 (Functional Genomics), IBS 7050 (Biomedical Neurobiology), or IBS 7100 (Biomedical Neuropharmacology), each worth 2 credits. In addition, students continue with BMB 7890 (Journal Club, 1 credit) and IM 7060 (Lab Rotation, 1 credit), bringing the total to 10 credits.

During the Spring/Summer semester, students choose one of the courses: IM 7450 (Current Trends in Immunology), IM 7650 (Current Trends in Host-Microbiome Interactions), or IM 7996 (Research), each worth 2 credits.

**Lab Rotations** During their first two semesters, new students will complete three eight-week rotations in labs of their choosing. Early in the fall semester, faculty members interested in mentoring students will present an overview of their ongoing research.

**Oral Preliminary Examinations** The purpose of the oral preliminary examinations is to assess the student's ability to think critically and integrate concepts from various disciplines. These exams correspond to the three fundamental courses taken during the winter semester: Immunology, Bacteriology, and Virology. Each exam lasts one hour and is conducted by a panel of faculty experts in the respective field. The exams are scheduled over the course of a week, and all material covered in the courses is subject to questioning.

Upon satisfactory performance in all three exams, the student becomes eligible to select a lab for dissertation research. If a student's performance in one or more exams is unsatisfactory, they will be re-examined in the deficient areas in August. Should performance remain unsatisfactory, the Department Graduate Committee will decide whether the student must complete remedial work or be dismissed from the program.

## Year Two:

The goals of the second year are professional development, acclimation to the research environment, and achieving Ph.D. candidacy by completing the Qualifying Examination and Prospectus. During the Fall semester, students enroll in IM 7996 (Research) and have the option to take IBS 7140 (Fundamentals of Data Science) for 3 credits, totaling 9 credits for the semester.

In the Winter semester, students take MGG 7091 (Scientific Communication), a 2-credit course, and IM 7996 (Research) with variable credits, again totaling 9 credits.

In the summer, students select one of the following 2-credit courses: IM 7996 (Research), IM 7450 (Current Trends in Immunology), or IM 7650 (Current Trends in Host-Microbiome Interactions).

## PhD candidacy

Achieving Ph.D. candidacy is a major milestone in the doctoral process and is required for registering in the dissertation research series (IM 9991 & IM 9992). To achieve candidacy, students must file a Plan of Work, secure its approval from the Graduate School, establish a Dissertation Committee, and complete the Qualifying Examination. The Dissertation Committee

typically includes the student's research mentor, who serves as chair, and three additional members, one of whom must be from outside the Biochemistry, Microbiology, and Immunology Department. The Dissertation Committee is responsible for monitoring the student's progress and offering guidance as they advance toward their degree.

The Immunology and Microbiology Qualifying Examination includes both written and oral components and is administered by the Dissertation Committee. Students are expected to complete the Qualifying Examination and submit their Prospectus by July 1 of their second year.

## Third Year and beyond:

Students register for IM 9991 (Dissertation Research and Direction -I) in the Fall semester and IM 9992 (Dissertation Research and Direction-II) in the Winter semester, each worth 9 credits to fulfill the required 18 dissertation credits. In subsequent years, students enroll in IM 9995 (Maintenance Credit).

In summary, candidates for the doctoral degree must complete sixty credits beyond the bachelor's degree, including eighteen credits in doctoral dissertation direction. The eighteen-credit dissertation requirement is fulfilled by registering for IM 9991 & IM 9992 (Doctoral Dissertation Research and Direction I and II), in consecutive academic year semesters.

## Ph.D. Dissertation, Final Defense, and Graduation

After all required coursework has been completed and the dissertation committee confirms that the student is ready to write and defend their dissertation, the student is then able to start planning for their Final Defense. The process includes writing of the dissertation and the public defense. The Immunology and Microbiology Programs requires that

students have at least one first author paper either submitted and in the review process or published at the time of the defense.