

MICROBIOLOGY AND IMMUNOLOGY (PHD)

The PhD in Microbiology and Immunology trains students for a career in research and teaching in microbiology, virology, immunology or molecular biology. The Department of Microbiology and Immunology creates an environment through courses, laboratory work, and other activities to allow students to acquire the tools necessary to work independently and to think critically. The department instills a sense of thoroughness, accuracy, and knowledge of common research tools that is indispensable. Students will be able to independently analyze and evaluate scientific problems and be responsible for their research by the end of their program.

Related Programs

Master's

- Microbiology and Immunology (MS) (<https://catalog.luc.edu/graduate-professional/graduate-school/health-sciences/biomedical-sciences/microbiology-immunology-ms/>)

Combined

- Microbiology and Immunology (MD/PhD) (<https://catalog.luc.edu/graduate-professional/dual-degree-programs/microbiology-immunology-md-phd/>)

Curriculum

The Graduate School at the Health Sciences Campus offers a PhD degree program in the biomedical sciences through the Integrated Program in Biomedical Sciences (IPBS). IPBS is an umbrella admission program in which students are admitted and undergo laboratory rotations before choosing an advisor and specialization track.

The following six tracks are offered in the IPBS:

- Biochemistry, Molecular & Cancer Biology
- Cell & Molecular Physiology
- Integrative Cell Biology
- Microbiology & Immunology
- Molecular Pharmacology & Therapeutics
- Neuroscience

Students receive rigorous training in the fundamentals of the scientific method, oral and written scientific communication, data analysis and presentation, critical analysis of scientific literature, and practical laboratory skills through a combination of coursework and dissertation research. Dissertation research is conducted under the direction of an advisor and Dissertation Committee.

IPBS Course Requirements

The PhD program consists of 48 credit hours of course work in the first two to three years plus research culminating in a dissertation. The course work consists of a Core Curriculum of 14 credit hours, at least 15 credit hours of electives and up to 19 credits hours of Research. Students who take more than 15 credits of electives can reduce the number of Research credits accordingly. The electives include track-specific courses plus specialized courses offered by any track. Details about the electives required for each track can be found in the individual IPBS PhD track catalog pages. IPBS students also enroll in a Seminar

and Journal Club course every semester. Students enroll in Dissertation Supervision after they have completed the required 48 credit hours.

| Code | Title | Hours |
|------------------------------------|--|-----------|
| Core Curriculum | | |
| BMSC 402 | Statistical Methods for Biomedical Science | 3 |
| BMSC 405 | Ethics in Biomedical Sciences | 1 |
| BMSC 410 | Biochemistry and Molecular Biology | 4 |
| BMSC 412 | Cell Biology | 4 |
| BMSC 416 | Methods Biomedical Science | 1 |
| BMSC 418 | Presentation skills | 1 |
| Track Specific Requirements | | |
| Track Required Coursework | | 15 |
| Research ¹ | | 19 |
| Seminar | | |
| Journal Club | | |
| Dissertation Supervision | | 0 |
| Total Hours | | 48 |

¹ Students can choose to take more than 15 credits of electives and reduce research credits accordingly.

Microbiology and Immunology Track Specific Course Requirements

The PhD in Microbiology and Immunology requires 48 credit hours and consists of the IPBS Core Curriculum plus Microbiology and Immunology Electives, Research, Journal Club, Seminar, a comprehensive examination, and completion of a dissertation.

| Code | Title | Hours |
|--|---|--------------|
| IPBS Core Curriculum | | 14 |
| Microbiology and Immunology Electives (see notes) | | 15 |
| MIIM 402 | Microbes & Hosts | |
| MIIM 411 | Basic Molecular Microbiology | |
| MIIM 413 | Basic Concepts of Immunology | |
| MIIM 431 | The Molecular Biology of Viruses | |
| MIIM 442 | Cell & Molecular Immunology | |
| MIIM 471 | Molecular Microbial Genetics | |
| MIIM 502 | Special Topics (2 sessions required; additional sessions may be taken up to total of 4 credits) | |
| IDIM 502 | Special Topics in Infectious Disease and Immunology (Optional) | 5 |
| MIIM 492 | Research (hours vary) | 19 |
| MIIM 501 | Seminar | 0 |
| MIIM 503 | Current Literature | 1 |
| MIIM 600 | Dissertation Supervision | 0 |
| Total Hours | | 48-50 |

Note: students required to take 2 MIIM electives, and may choose other electives from other programs with GPD approval. At least two special topics classes are required and up to 2 additional special topics classes may be taken to bring the track coursework credit number to 15.

Comprehensive Examination

In addition to the course work, students must pass a Comprehensive Exam which involves preparing a mock grant proposal. The

Comprehensive Exam also tests the student's understanding of the scientific method, oral and written communication skills and general biomedical research knowledge. The Comprehensive Exam usually is taken during the summer of the second year. The written mock grant proposal is presented to the student's Comprehensive Exam Committee and evaluated during a meeting with the Committee. Students who pass their Comprehensive Exam are permitted to continue in the IPBS.

Research and Dissertation

The Integrated Program in Biomedical Sciences is a research-intensive PhD program. Students are expected to undertake an independent, original experimental study resulting in new and significant contributions to knowledge in the biomedical sciences.

Lab Rotations: Students undergo three laboratory rotations beginning in the first semester to identify a research advisor. Students select laboratories for each rotation from a list of available advisors and in consultation with the Associate Dean for Graduate Education. After identifying an advisor, students select a specialization track and begin attending the Journal Clubs, Seminars and taking track-specific electives. Each track has a Graduate Program Director to advise students.

Dissertation Research: After students pass their Comprehensive Exam, they form a Dissertation Committee and meet with the Committee starting in the third year to receive approval of their Dissertation Proposal. Research on the dissertation continues with regular Dissertation Committee meetings until the completion of the dissertation. The final dissertation must be presented in a public seminar, approved by the Dissertation Committee and deposited in a public database.

Graduate & Professional Standards and Regulations

Students in graduate and professional programs can find their Academic Policies in Graduate and Professional Academic Standards and Regulations (<https://catalog.luc.edu/academic-standards-regulations/graduate-professional/>) under their school. Any additional University Policies supersede school policies.

Learning Outcomes

Upon completion of this program, students will be able to:

- Demonstrate a general knowledge base in the biomedical sciences with an understanding of fundamental biochemical, molecular and cellular processes and common biomedical research methods.
- Demonstrate a deep knowledge in microbiology and immunology.
- Propose original biomedical research questions and design experiments to address these questions.
- Execute critical experiments to address the relevant biomedical research questions.
- Search and critically evaluate the scientific literature and scientific data.
- Clearly and effectively communicate scientific information in both oral and written forms.
- Incorporate high standards of ethics into research design, execution, data interpretation and presentation.