

# MICROBIOLOGY AND IMMUNOLOGY (MS)

## Master of Science in Microbiology and Immunology (MBIOMS)

Unit: School of Medicine (<http://louisville.edu/medicine/>) (GM)  
 Department: Microbiology and Immunology (<http://louisville.edu/medicine/departments/microbiology/>)  
 Program Website (<http://louisville.edu/medicine/departments/microbiology/degrees/>)  
 Academic Plan Code(s): MBIOMS

## Program Information

The Department of Microbiology and Immunology, in the School of Medicine, offers a program of study leading to the degree of Master of Science. The MS program includes training in a broad range of research areas using state-of-the-art immunological, microbiological, and molecular technologies. Our Department strives to foster and sustain an environment of inclusiveness that empowers us all to achieve our highest potential. We commit ourselves to building an exemplary educational community that offers a nurturing and challenging intellectual climate, a respect for the spectrum of human diversity, and a genuine understanding of the many differences that enrich a vibrant metropolitan research university. We expect every member of our academic family to embrace the underlying values of this vision and to demonstrate a strong commitment to attracting, retaining, and supporting students, faculty, and staff.

## Admission Requirements

For admission to the MS program, the applicant must have attained a BS or BA degree with a minimum grade-point average of 3.0 (on a 4.0 scale). All applicants accepted into the master's program must be self-supporting, as financial assistance is not available.

In addition, the following should be submitted online (<https://graduate.louisville.edu/admission/apply/>) directly to the Graduate School, Graduate Admissions:

- A completed application form and application fee
- The TOEFL/IELTS/Duolingo (when applicable)
- Three letters of recommendation
- A brief statement of purpose describing interests and career goals
- A current resume or curriculum vitae
- A letter of agreement from a Department of Microbiology and Immunology faculty member to mentor student
- Official transcripts of all undergraduate and graduate course work submitted to the Graduate School (for international applicants, transcript credentials must be verified by a NACES accredited organization)

The applicant must meet the other general requirements of the Graduate School as outlined in the Application and Admission section (<https://catalog.louisville.edu/graduate/application-admission/>) of this catalog. The applications are accepted on a rolling basis.

The applicant is expected to have completed the following undergraduate courses prior to admission to the graduate program: Introductory Biology, Organic Chemistry, Introductory Calculus, and Biochemistry.

Prospective students may be invited for a personal interview with members of the admissions committee and departmental faculty as part of the application process.

## Program Requirements Thesis Option

Code	Title	Hours
<b>Coursework Requirements</b>		
MBIO 601 or MBIO 602	Molecular Microbiology (2 credits) <sup>1</sup> Immunology	3
MBIO 606	Seminar	1
MBIO 610	Methods and Analysis in the Biomedical Sciences	2
MBIO 619	Research	1-12
ASNB 622	Analytics in Biomedical Science	3
BIOC 630	Responsible Conduct of Research: Survival Skills and Research Ethics	1
<b>Electives<sup>2</sup></b>		
BIOC 667	Cell Biology	3
BIOC 668	Molecular Biology	3-4
MBIO 601	Molecular Microbiology <sup>1</sup>	2
MBIO 602	Immunology <sup>1</sup>	3
MBIO 604	General Virology	1
MBIO 611	Learning Theories & Instructional Strategies in Science Education	2
MBIO 621	Advanced Immunology: Innate and Adaptive Immunity	2
MBIO 622	Advanced Immunology of Disease	2
MBIO 632	Basic Immunology	1
MBIO 687	Microbial Pathogenesis	2
BIOC 663	High-Throughput Sequencing Data Analysis	3
BIOC 670	Biomedical Genetics and Genomics	3-5
<b>Minimum Total Hours</b>		<b>35-38</b>

<sup>1</sup> If MBIO 601 is taken as a Required Course then MBIO 602 can be taken as an elective. Likewise, if MBIO 602 is taken as a Required Course then MBIO 601 can be taken as an elective.

<sup>2</sup> A minimum of three courses is required and must be a scientific course from the list below with at least two being MBIO. Additional courses outside of the department can be taken in consultation with the research advisor and director of graduate studies.

## Research Advisor and Project

Students in the MS thesis option program are required to obtain a Research Advisor before being admitted to the program. Students should form a Thesis Committee and decide upon a research project early in the second semester of graduate study. Students, in consultation with their Advisor, should form a Thesis Committee consisting of three graduate faculty members with at least two with primary appointments in the Department of Microbiology and Immunology. Should the Research Advisor be an associate member of the Department of Microbiology and Immunology, one of the Microbiology and Immunology Primary faculty will serve as a Co-Advisor. The Thesis Committee may consist of more than three faculty members, however, a majority of the faculty on the Thesis Committee must have primary appointments in the Department

of Microbiology and Immunology. Selection of the Research Advisor and formation of the Thesis Committee must be approved by the Chair of the Microbiology and Immunology and the Associate Dean for Graduate Education in the School of Medicine.

### Evaluation of Student's Progress

The Thesis Committee will meet at least annually to evaluate the student's progress. Students are expected to maintain satisfactory progress in their research project each semester. Students may proceed to degree candidacy provided they have successfully maintained an overall and program GPA of 3.0 or higher (with a grade no lower than a B-minus in any M BIO course), Pass grades in all required courses with Pass/Fail (P/F) grading, and successful completion of all required coursework.

### Master's Thesis Examination

Students pursuing the thesis option are required to write and defend a master's degree thesis. The thesis must be a work of sufficient quality to demonstrate the student's ability to participate effectively on a research project. Following preliminary review and approval by the Research Advisor, the thesis should be distributed to the Thesis Committee members, and a written request submitted to the Graduate School, at least two weeks prior to the scheduled date of the final oral exam. The final oral defense/exam will be preceded by a research seminar open to all graduate faculty members, students, and other interested persons. The oral exam will be administered by the Thesis Committee. To satisfactorily pass the thesis defense, a majority of the committee members must approve it. The final copy of the thesis must be submitted as advised by the Graduate School through the ThinkIR repository. The directions on submission will be provided upon review of the thesis by the Graduate School. Please find the published deadline dates (<https://louisville.edu/graduate/current-students/thesis-dissertation-information/>) by the Graduate School.

Guidelines and requirements concerning the thesis and final oral examination are set forth on the Graduate School website (<https://louisville.edu/graduate/current-students/thesis-dissertation-information/>).

### Non-Thesis Option

Code	Title	Hours
<b>Coursework Requirements</b>		
M BIO 601 or M BIO 602	Molecular Microbiology <sup>1</sup> Immunology	2-3
M BIO 606	Seminar (Fall and Spring - 1 Credit Hour each semester)	2
<b>Electives<sup>2</sup></b>		
Select Courses to Total 18-19 Credit Hours:		
BIOC 667	Cell Biology	3
BIOC 668	Molecular Biology	3-4
M BIO 610	Methods and Analysis in the Biomedical Sciences	2
M BIO 601	Molecular Microbiology <sup>1</sup>	2
M BIO 602	Immunology <sup>1</sup>	3
M BIO 604	General Virology	1
M BIO 611	Learning Theories & Instructional Strategies in Science Education	2
M BIO 619	Research	1-12

M BIO 621	Advanced Immunology: Innate and Adaptive Immunity	2
M BIO 622	Advanced Immunology of Disease	2
M BIO 623	Scientific Writing and Hypothesis Testing	1
M BIO 632	Basic Immunology	1
M BIO 687	Microbial Pathogenesis	2
ASNB 622	Analytics in Biomedical Science	3
BIOC 630	Responsible Conduct of Research: Survival Skills and Research Ethics	1
BIOC 663	High-Throughput Sequencing Data Analysis	3
BIOC 670	Biomedical Genetics and Genomics	3

**Minimum Total Hours 36-37**

<sup>1</sup> If M BIO 601 is taken as a Required Course then M BIO 602 can be taken as an elective. Likewise, if M BIO 602 is taken as a Required Course then M BIO 601 can be taken as an elective.

<sup>2</sup> A minimum of three courses is required and must be a scientific course from the list below with at least two being M BIO. Additional courses outside of the department can be taken in consultation with the research advisor and director of graduate studies.

If the student has satisfactorily completed the required courses and total credit hour requirements with an overall and program GPA of 3.0, then the student may register in master's candidacy.

### Evaluation of Student's Progress

Students will meet with the associate director of graduate studies at the conclusion of the Year 1 Fall and Year 1 Spring semesters. Students are required to identify a faculty advisor by completion of Year 1. The faculty advisor will provide mentorship through completion of the master's final oral examination. Students are expected to maintain satisfactory progress in their coursework. Students may proceed to degree candidacy provided they have successfully maintained an overall and program GPA of 3.0 or higher (with a grade no lower than a B-minus in any M BIO course), Pass grades in all required courses with Pass/Fail grading, and successful completion of all required coursework.

### Master's Final Oral Examination

Students are required to write either a literature-based research proposal or a literature review and orally defend it to their master's final examination committee. The decision to write a research proposal or literature review will be made between the student and their faculty advisor. The Department of Microbiology and Immunology curriculum committee will name the master's final examination committee, which will be comprised of at least three graduate faculty members with at least two members with primary appointments in the Department of Microbiology and Immunology. To satisfactorily pass the master's final exam, a majority of the committee members must approve.