

# BACHELOR OF SCIENCE IN MEDICAL MICROBIOLOGY AND IMMUNOLOGY

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Rapid and expanding advances in the field of medical microbiology and immunology have created a need for employees with expertise in a variety of areas. Our graduates are prepared for exciting careers in the expanding medical, clinical, pharmaceutical, biotechnological, molecular and health industries. This program also prepares the student for advanced study in specialized graduate science, health and medical programs.

The program offers students a range of classroom, laboratory and independent research experiences. All courses consist of lecture and hands-on laboratories where students perform the most current research techniques. In addition to courses in the sciences, the University Curriculum (<http://catalog.qu.edu/academics/university-curriculum/>) course offerings prepare students with a broad-based conceptual understanding of science and its role in society.

Included in this program is a two-semester required undergraduate seminar/research experience performed with faculty in research laboratories. This experience allows the student to develop the expertise and experience to be successful in beginning a career or in graduate study. All of our students give formal presentations of their independent research projects. Many have presented the results of research experiences at professional scientific meetings.

Successful third- and fourth-year students may be able to obtain internships or part-time work experiences during the school year and/or summer in government labs and major pharmaceutical or biotechnology companies located in the region. To remain in good standing within the program, the student must maintain a math and science GPA of 2.25.

## Microbiology Program Requirements

Code	Title	Credits
<b>Microbiology Core Requirements</b>		<b>15</b>
BMS 370	General Microbiology	3
BMS 370L	General Microbiology Lab	1
BMS 372	Pathogenic Microbiology	3
BMS 372L	Pathogenic Microbiology Lab	1
BMS 375	Immunology	3
BMS 375L	Immunology Lab	1
BMS 478	Microbiology Seminar	1
BMS 479	Microbiology Research	2

Code	Title	Credits
<b>Biological and Physical Science</b>		<b>36</b>
BIO 150	General Biology for Majors	4
BIO 150L	General Biology for Majors Laboratory	
BIO 151	Molecular and Cell Biology and Genetics	4
BIO 151L	Molecular and Cell Biology and Genetics Lab	

CHE 110	General Chemistry I	3
CHE 110L	General Chemistry I Lab	1
CHE 111	General Chemistry II	3
CHE 111L	General Chemistry II Lab	1
CHE 210	Organic Chemistry I	3
CHE 210L	Organic Chemistry I Lab	1
CHE 211	Organic Chemistry II	3
CHE 211L	Organic Chemistry II Lab	1
CHE 315	Biochemistry I	3
CHE 315L	Biochemistry I Lab	1
PHY 110	General Physics I	3
PHY 110L	General Physics I Lab	1
PHY 111	General Physics II	3
PHY 111L	General Physics II Lab	1

Code	Title	Credits
<b>Microbiology and Science Electives</b>		<b>14-16</b>
Select 4 for at least 14 credits <sup>1</sup>		
BIO 346 & 346L	Cell Physiology and Cell Physiology Lab	4
BIO 471 & 471L	Molecular Genetics and Molecular Genetics Lab	4
BMS 278	Research and Technology	3
BMS 299	Biomedical Sciences Journal Club	1
BMS 319	Public Health: Epidemiology of Infectious Diseases	3
BMS 373 & 373L	Mycology and Mycology Lab	4
BMS 470	Virology	4
BMS 472	Biotechnology	4
BMS 473	Infections of Leisure	3
BMS 474	Power of Plagues	3
BMS 475	Special Topics in Microbiology	1-4
BMS 477	Critical Analysis and Reasoning In the Biomedical Sciences	2
BMS 481	Research Techniques in Biomedical Sciences	1-4
BMS 482	Independent Study in Microbiology	1-4
BMS 483	Independent Study in Microbiology	1-4

Code	Title	Credits
<b>Immunology Electives</b>		<b>3</b>
Select 1 for at least 3 credits		
BMS 319	Public Health: Epidemiology of Infectious Diseases	3
BMS 378	Vaccines and Vaccine-Preventable Diseases	3
BMS 473	Infections of Leisure	3
BMS 474	Power of Plagues	3
BMS 482	Independent Study in Microbiology	1-4
BMS 483	Independent Study in Microbiology	1-4

Code	Title	Credits
<b>Science Electives</b>		<b>16</b>
Select 4-6 for at least 16 credits, from any BMS, HSC, BIO, CHE, PHY course at 200 level or above		

Code	Title	Credits
<b>University Curriculum</b>		<b>46</b>
Additional electives and graduate courses may be selected with the approval of the BMS Department Chair.		
Math requirement: MA 140, but MA 141 or above is recommended for students preparing for graduate or professional school		
UC Personal Inquiry: MA 275 is strongly recommended		

<sup>1</sup> BIO 471 and BMS 470 strongly recommended.

## Student Learning Outcomes

Upon completion of the medical microbiology and immunology program, students will demonstrate the following competencies:

- Core Disciplines:** Demonstrate advanced knowledge of the foundational principles in the disciplines of biology, chemistry and physics.
- Advanced Knowledge:** Demonstrate advanced knowledge of the fundamental concepts of microbiology and immunology.
- Organisms and Host:** Understand the symbiotic relationships that can exist between microorganisms and humans (mutualistic, commensal and pathogenic).
- Professional Skills:** Master the essential technical and analytical skills of the microbiologist/immunologist.
- Effective Scientist:** Engage in scientific research and effectively communicate the dissemination of results to various audiences.
- Responsible Citizen:** Evaluate the social and ethical impact of scientific discoveries on medical practice.

## Mission Statement

The mission of the Medical Microbiology and Immunology degree program is to provide students with a solid basic science foundation in preparation for studying the upper-level sciences related to immunology and microbiology. This is meant to provide many opportunities to students who are interested in pursuing graduate programs (MS/PhD) in the micro-biological sciences (e.g., bacteriology, virology, public health, etc.), as well as sciences related to immunology (e.g., vaccines, epidemiology, cancer biology, etc.).

Additionally, students may pursue one of the medical-related professions (e.g., physician, physician assistant, dentist, veterinarian, pharmacist, chiropractor, etc.). Students who choose not to go on to graduate or professional school are able to apply for research and development positions in pharmaceutical and biotechnology companies.

Students learn about molecular biology with hands-on student-directed laboratory projects where thinking, planning and problem-solving skills are developed. Independent research projects under the guidance of faculty allow development of these skills with “real-world” experiences.

Student skills are evaluated continuously with written and oral presentations, encouraging the refinement of communication skills critical to a successful career. Products of student research activity are presented in seminars and at regional or national scientific meetings.

## Admission

Admission into the Medical Microbiology and Immunology program is dependent on the applicant’s potential to pursue a university program and on past academic performance. The high school student applying for admission into the Medical Microbiology and Immunology program should have a strong background in the biological sciences. To remain in good standing within the program, the student must maintain a math and science GPA of 2.25.

## Transfer Students from within Quinnipiac University

Students currently attending Quinnipiac University in another program may be accepted into the Medical Microbiology and Immunology program based upon a review of qualification by the program director. Students may apply upon completion of at least one semester at Quinnipiac University. Students transferring in as a junior (i.e., 57 credits or more) must have completed both the general biology requirements, specifically, 8 credits of BIO 101 & BIO 102 *or* BIO 150 & BIO 151, and the general chemistry requirements, specifically, 8 credits of Quinnipiac’s CHE 110 & CHE 111 prior to entry into the upper-class component of the program. Student also must meet the performance standards of the program (minimum math and science GPA of 2.25).

## Transfer Students from Other Colleges and Universities

Transfer students from other colleges and universities may be accepted into the Medical Microbiology and Immunology program. These students must meet the program’s performance standards and course requirements. For all transfer students, a minimum GPA of 2.67 is required. Students transferring in as a junior (i.e., 57 credits or more) must have completed both the general biology requirements, specifically, the equivalent of 8 credits of Quinnipiac’s BIO 101 & BIO 102 *or* BIO 150 & BIO 151, and the general chemistry requirements, specifically, the equivalent of 8 credits of Quinnipiac’s CHE 110 & CHE 111 prior to entry into the upper-class component of the program. Transfer students wishing to enter this program will be given appropriate transfer credit for previous college work.

## Pre-Medical Studies Program

Students majoring in Health Science Studies, Biology, Biomedical Sciences or the pre-health track of Behavioral Neuroscience may fully participate in the pre-medical studies program. The curriculum in this degree program can fulfill the science prerequisites for most professional schools. Students should refer to Pre-Medical Studies (<http://catalog.qu.edu/academics/premedical-studies/>) for more information about the pre-medical studies program and contact the Health Professions Advisory Committee for further academic advising.

## Seamless Transfer Agreement with Gateway Community College (GCC), Housatonic Community College (HCC) and Norwalk Community College (NCC)

Under this Transfer Agreement, GCC, HCC and NCC graduates will be guaranteed admission into a bachelor's degree program with third year (junior) status at Quinnipiac University on the condition that they:

- Graduate with an associate in arts, an associate in science in business, College of Technology engineering science, nursing or an allied health degree with a minimum cumulative GPA of 3.00 (this may be higher in specific programs).
- Satisfy all other Quinnipiac University transfer admission requirements and requirements for intended major.

Quinnipiac University agrees to accept the general education embedded in these associate degree programs in accordance with Quinnipiac preferred choices for general education as meeting all the requirements of its undergraduate general education except for the Integrative Capstone Experience and where courses are encumbered by the major (e.g., General Chemistry for the Disciplinary Inquiry Natural Science requirement for a Biochemistry major).

### Suggested Transfer Curriculum for BS in Medical Microbiology and Immunology

A minimum of 60 credits is required for transfer into the BS in Medical Microbiology and Immunology program. Below is a sample plan of study for the first two years.

Course	Title	Credits
<b>First Year</b>		
<b>Fall Semester</b>		
English		3
General Biology with Lab		4
General Chemistry with Lab		4
Math - Precalculus		3
<b>Credits</b>		<b>14</b>
<b>Spring Semester</b>		
English II		3
General Biology II with Lab		4
General Chemistry II with Lab		4
Math - Calculus		3
Elective		3
<b>Credits</b>		<b>17</b>
<b>Second Year</b>		
<b>Fall Semester</b>		
Anatomy & Physiology I with Lab		4
General Physics with Lab		4
Elective		3
Elective		3
<b>Credits</b>		<b>14</b>
<b>Spring Semester</b>		
Anatomy & Physiology II with Lab		4
General Physics II with Lab		4
Microbiology with Lab		4

Elective	3
<b>Credits</b>	<b>15</b>
<b>Total Credits</b>	<b>60</b>