DUAL-DEGREE BS/MHS IN BIOMEDICAL SCIENCES (4+1)

Program Contact: Thomas Martin (Thomas.Martin@qu.edu) 203-582-3368

The Department of Biomedical Sciences offers a five-year program leading to a Dual-Degree BS in Biomedical Sciences/MHS in Biomedical Sciences (4+1) with concentrations in Medical Sciences or Microbiology. The curriculum for this dual-degree program provides a solid foundation in the basic and biomedical sciences, which allows students to pursue many different avenues of opportunity depending upon their goals and interests. Students completing this graduate program may qualify for employment in the pharmaceutical and biotechnology industries; the medical diagnostics industry; university-based biomedical research; and city, state and federal health/research laboratories. Additionally, a student with this degree may wish to continue his/her education in graduate/professional school in: biomedical sciences, medicine, dentistry, veterinary medicine, physician assistant, pathologists’ assistant, cardiovascular perfusion, microbiology and immunology, molecular biology, biotechnology, neurobiology, pharmacology, toxicology, cancer biology, plus many other areas.

To remain in good standing within the program, students must maintain a GPA of 3.0 overall, as well as in math and science for the remainder of their undergraduate careers. Students also must maintain an overall GPA of 3.0 for the graduate portion and successfully pass the comprehensive examination in their final semester of their graduate year.

Dual-Degree BS/MHS in Biomedical Sciences (Concentrations in Medical Sciences or Microbiology) Curriculum

<table>
<thead>
<tr>
<th>Course</th>
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<td>EN 101</td>
<td>Introduction to Academic Reading and Writing</td>
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<td>FYS 101</td>
<td>First-Year Seminar</td>
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<tr>
<td>BIO 151</td>
<td>Molecular and Cell Biology and Genetics</td>
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<td>CHE 111 &amp; 111L</td>
<td>General Chemistry II and General Chemistry II Lab</td>
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<td>EN 102</td>
<td>Academic Writing and Research</td>
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<td>BMS 278</td>
<td>Research and Technology</td>
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<td>Human Anatomy and Physiology I and Human Anatomy and Physiology Lab I</td>
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<td>BMS 472</td>
<td>Biotechnology (Lecture &amp; Lab Combined)</td>
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<td><strong>Credits</strong></td>
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<td>BMS 522 &amp; 522L</td>
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<td>QU 420</td>
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<tr>
<td>BMS 502</td>
<td>Research Methods</td>
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1. Calculus I
Dual-Degree BS/MHS in Biomedical Sciences (4+1)

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<thead>
<tr>
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<tbody>
<tr>
<td>BMS 532</td>
<td>Histology and Lab &amp; 532L and Histology Lab</td>
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**Graduate Level BMS Specialization/Elective**

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**Spring Semester**

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1. Minimum mathematics requirement: MA 140. For those interested in graduate or professional schools, MA 141 is recommended.

2. The comprehensive exam must be completed by April 15 of the fifth year.

**Microbiology**

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<tr>
<td>BMS 522</td>
<td>Immunology</td>
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<tr>
<td>BMS 570</td>
<td>Virology</td>
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<td>BMS 572</td>
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**Specialization Electives**

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<tbody>
<tr>
<td>BIO 568</td>
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<td>BIO 571</td>
<td>Molecular Genetics</td>
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<tr>
<td>BIO 605</td>
<td>DNA Methods Laboratory</td>
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</tr>
<tr>
<td>BIO 606</td>
<td>Protein Methods Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BMS 525</td>
<td>Vaccines and Vaccine Preventable Diseases</td>
<td>3</td>
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<tr>
<td>BMS 526</td>
<td>Epidemiology</td>
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<td>BMS 528</td>
<td>Advanced Clinical Parasitology</td>
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<tr>
<td>BMS 569</td>
<td>Antimicrobial Therapy</td>
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<tr>
<td>BMS 573</td>
<td>Mycology</td>
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<td>BMS 575</td>
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<td>BMS 576</td>
<td>Drug Discovery and Development</td>
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<tr>
<td>BMS 579</td>
<td>Molecular Pathology</td>
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<tr>
<td>BMS 584</td>
<td>Emerging and Re-emerging Infectious Diseases</td>
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<td>BMS 585</td>
<td>Outbreak Control</td>
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<tr>
<td>BMS 595</td>
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**Areas of Specialization**

**Medical Sciences**

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<tr>
<td>BMS 522</td>
<td>Immunology</td>
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<tr>
<td>BMS 532</td>
<td>Histology and Lab</td>
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**Specialization Electives**

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<tbody>
<tr>
<td>BIO 515</td>
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<td>BIO 568</td>
<td>Molecular and Cell Biology</td>
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<td>BIO 571</td>
<td>Molecular Genetics</td>
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<td>BIO 605</td>
<td>DNA Methods Laboratory</td>
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<td>BIO 606</td>
<td>Protein Methods Laboratory</td>
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<td>BMS 508</td>
<td>Advanced Biology of Aging</td>
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<td>BMS 520</td>
<td>Neuropharmacology</td>
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<tr>
<td>BMS 521</td>
<td>Advances in Hematology</td>
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<tr>
<td>BMS 522</td>
<td>Immunology</td>
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<tr>
<td>BMS 527</td>
<td>Pharmacology</td>
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<td>BMS 532</td>
<td>Histology and Lab</td>
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<tr>
<td>BMS 535</td>
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<tr>
<td>BMS 552</td>
<td>Toxicology</td>
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<tr>
<td>BMS 561</td>
<td>Immunohematology</td>
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<tr>
<td>BMS 562</td>
<td>Blood Coagulation and Hemostasis</td>
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<td>BMS 563</td>
<td>Anemias</td>
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<td>BMS 564</td>
<td>Fundamentals of Oncology</td>
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<td>BMS 565</td>
<td>Leukemia</td>
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<td>BMS 576</td>
<td>Drug Discovery and Development</td>
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<td>BMS 578</td>
<td>Cellular Basis of Neurobiological Disorders</td>
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<td>BMS 579</td>
<td>Molecular Pathology</td>
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<td>BMS 583</td>
<td>Forensic Pathology</td>
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<td>BMS 591</td>
<td>The New Genetics and Human Future</td>
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<td>BMS 598</td>
<td>Synaptic Organization of the Brain</td>
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<td>BMS 599</td>
<td>Biomarkers</td>
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<td>PA 515</td>
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**Graduate Science Electives**

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<td>Advanced Biochemistry</td>
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<td>BIO 568</td>
<td>Molecular and Cell Biology</td>
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<td>BIO 571</td>
<td>Molecular Genetics</td>
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<td>DNA Methods Laboratory</td>
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<td>BIO 606</td>
<td>Protein Methods Laboratory</td>
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<td>BMS 508</td>
<td>Advanced Biology of Aging</td>
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<td>BMS 510</td>
<td>Biostatistics</td>
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<td>BMS 511</td>
<td>Writing for Scientists</td>
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<td>BMS 517</td>
<td>Human Embryology</td>
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**Comprehensive Examination**

The comprehensive examination in biomedical sciences (2 credits) is a requirement for the non-thesis option in the Biomedical Sciences program. The purpose of the exam is two-fold. First, the student must demonstrate broad and specific knowledge expected of someone holding a master's degree. Second, the student must be able to integrate knowledge obtained from individual courses into unified concepts which link the student's own specialization to other fields of study. The student is given two opportunities to demonstrate competency. A written essay exam is administered by a designated faculty member. Students should schedule an appointment with the program director before registering for the comprehensive exam.
BMS 518 Pathophysiology 3
BMS 520 Neuropharmacology 3
BMS 521 Advances in Hematology 3
BMS 525 Vaccines and Vaccine Preventable Diseases 3
BMS 526 Epidemiology 3
BMS 527 Pharmacology 3
BMS 528 Advanced Clinical Parasitology 4
BMS 532 Histology and Lab 4
BMS 535 Histochemistry and Lab 3
BMS 552 Toxicology 3
BMS 561 Immunohematology 3
BMS 562 Blood Coagulation and Hemostasis 3
BMS 563 Anemias 3
BMS 564 Fundamentals of Oncology 4
BMS 565 Leukemia 3
BMS 569 Antimicrobial Therapy 3
BMS 570 Virology 4
BMS 572 Pathogenic Microbiology 4
BMS 573 Mycology 3
BMS 575 Food Microbiology 4
BMS 576 Drug Discovery and Development 3
BMS 578 Cellular Basis of Neurobiological Disorders 3
BMS 579 Molecular Pathology 3
BMS 583 Forensic Pathology 3
BMS 584 Emerging and Re-emerging Infectious Diseases 3
BMS 585 Outbreak Control 3
BMS 591 The New Genetics and Human Future 3
BMS 595 Transplantation Immunology 3
BMS 598 Synaptic Organization of the Brain 3
BMS 599 Biomarkers 3
BMS 688 Independent Study 2
BMS 689 Independent Study 2
PA 515 Human Physiology 4
PA 535 Disease Mechanisms 4

Student Learning Outcomes
Upon completion of the Dual-Degree BS/MHS in Biomedical Sciences (4+1) program, students will demonstrate the following competencies:

1. Foundational Knowledge: Demonstrate advanced knowledge of the major disciplines in the Biomedical Sciences (Biology, Chemistry, Physics, Physiology, Microbiology, Immunology, Pathophysiology).
3. Translational Science: Critically analyze how new research discoveries can be translated into effective patient treatments/interventions.
5. Effective Scientist: Engage in scientific research and effectively communicate the dissemination of results to various audiences.
6. Responsible Citizen: Evaluate the social and ethical impact of scientific discoveries on medical practice.

Admission to the Program
Students interested in applying to the Dual-Degree BS/MHS in Biomedical Sciences (4+1) with concentrations in Medical Sciences or Microbiology must meet with the program contact during the spring semester of their junior year. Following the meeting, the student may apply for admission into the program. Admission into the program is dependent on the applicant’s potential to pursue a university program and past academic performance. At the time of application submission, students must have a GPA of 3.0 overall, as well as in math and science. To remain in good standing within the program and be eligible to enter the graduate curriculum, the student must maintain a GPA of 3.0 overall, as well as in math and science for the remainder of their undergraduate careers.

Students in the Health Science Studies program who successfully complete (BIO 212/BIO 212L, CHE 211/CHE 211L, PHY 111/PHY 111L & BMS 370/BMS 370L) also may be eligible for admittance into the graduate portion of the program and should contact the program director.

Pre-Medical Studies Program
Students majoring in Health Science Studies, Biology, Biomedical Sciences or the natural science 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.

Mission Statement
The mission of Quinnipiac University’s Dual-Degree BS/MHS in Biomedical Sciences (4+1) program (with concentrations in Medical Sciences or Microbiology) is to provide students with the cutting-edge skills they need to manage the more complex operations carried out today in hospitals and research facilities, as well as allowing students to develop their critical thinking skills and knowledge of the biomedical sciences, sought after by PhD programs and medical schools. The program provides the student with a comprehensive knowledge to meet the education and technical needs of the biomedical profession in pharmaceutical, biotechnology, diagnostics and medical research. Students are guided in the principles and methods of scientific research, and they gain knowledge of the latest advances in biomedical, biotechnological and laboratory sciences—all directly applicable to real-world work environments.