

# BACHELOR OF SCIENCE IN BIOMEDICAL SCIENCES

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The curriculum for the Bachelor of Science in Biomedical Sciences program provides students with a solid foundation in the basic and biomedical sciences, which enables them to pursue many different avenues of opportunity depending on their goals and interests. Students completing this degree 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, students may wish to continue their education in graduate/professional school in: biological and/or biomedical sciences, medicine, dentistry, veterinary medicine, physician assistant, pathologists' assistant, forensic sciences, microbiological sciences, molecular biology, biotechnology, toxicology, neurobiology, plus many other areas.

Students who excel in this program (>3.00 GPA overall and in science/math) may be eligible to participate in a research project with a faculty member or an internship in an area company sometime during their junior or senior year. This depends upon the availability of mentors and internships at the particular time. Upper-level BMS students in good academic standing (>3.00 GPA overall and in science/math) may also be permitted to take two to three graduate courses to fulfill undergraduate degree requirements. See policy. (<http://catalog.qu.edu/university-policies/use-of-graduate-course-credits/>)

The technical standards for individuals working in the biomedical field may include the following abilities: to effectively communicate via oral and written expression; exhibit general fine motor skills and hand-eye coordination appropriate to performing delicate procedures; distinguish between subtle shades of color; read, comprehend and interpret scientific/medical information from professional sources. Reasonable accommodations will be considered on a case-by-case basis.

Students may choose to minor in *any* area of study, although BMS students often choose to pursue one (or more) of these particular minors:

1. Medical Microbiology and Immunology
2. Chemistry
3. Psychology

Students should work with their BMS major adviser and with their minor adviser to choose appropriate courses.

## BS in Biomedical Sciences Curriculum

In addition to courses in science and mathematics, students are required to take a selection of University Curriculum (<http://catalog.qu.edu/academics/university-curriculum/>) courses (designated UC on the curriculum). The entire curriculum is designed to provide students with a strong program in basic and biomedical sciences, as well as a well-rounded educational experience through the University Curriculum. To remain in good academic standing within the program, the student must maintain a GPA of 2.50 overall, as well as in math and science.

Course	Title	Credits
<b>First Year</b>		
<b>Fall Semester</b>		
BIO 150	General Biology for Majors	4
CHE 110 & 110L	General Chemistry I and General Chemistry I Lab	4
EN 101	Introduction to Academic Reading and Writing	3
FYS 101	First-Year Seminar	3
MA 140 or MA 141	Pre-Calculus <sup>1</sup> or Calculus of a Single Variable	3
<b>Credits</b>		<b>17</b>
<b>Spring Semester</b>		
BIO 151	Molecular and Cell Biology and Genetics	4
CHE 111 & 111L	General Chemistry II and General Chemistry II Lab	4
EN 102	Academic Writing and Research	3
BMS 278	Research and Technology	3
UC Disciplinary Inquiry		3
<b>Credits</b>		<b>17</b>
<b>Second Year</b>		
<b>Fall Semester</b>		
BIO 211 & 211L	Human Anatomy and Physiology I and Human Anatomy and Physiology Lab I	4
CHE 210 & 210L	Organic Chemistry I and Organic Chemistry I Lab	4
MA 275	Biostatistics	3
UC Disciplinary Inquiry		3
<b>Credits</b>		<b>14</b>
<b>Spring Semester</b>		
BIO 212 & 212L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Lab	4
CHE 211 & 211L	Organic Chemistry II and Organic Chemistry II Lab	4
BMS 370 & 370L	General Microbiology and General Microbiology Lab	4
UC Disciplinary Inquiry		3
<b>Credits</b>		<b>15</b>
<b>Third Year</b>		
<b>Fall Semester</b>		
PHY 110 & 110L	General Physics I and General Physics I Lab	4
BMS 375 & 375L	Immunology and Immunology Lab	4
Science Elective		3
UC Personal Inquiry		3
<b>Credits</b>		<b>14</b>
<b>Spring Semester</b>		
PHY 111 & 111L	General Physics II and General Physics II Lab	4
Choose one of the following		4
BMS 472	Biotechnology (Lecture & Lab Combined)	
BIO 471 & 471L	Molecular Genetics and Molecular Genetics Lab	
Science Elective		3-4

UC Personal Inquiry	3
<b>Credits</b>	<b>14-15</b>
<b>Fourth Year</b>	
<b>Fall Semester</b>	
BMS 318 Pathophysiology	3
CHE 315 Biochemistry I & 315L and Biochemistry I Lab	4
Science Elective	3-4
UC Personal Inquiry	3
Open Elective	3
<b>Credits</b>	<b>16-17</b>
<b>Spring Semester</b>	
Science Elective	3
SHS 420 Integrative Capstone	3
Science Elective	3-4
UC Personal Inquiry	3
Open Elective	3
<b>Credits</b>	<b>15-16</b>
<b>Total Credits</b>	<b>122-125</b>

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

Students interested in graduate or professional school should investigate research and/or an independent study.

## Science Electives

Take 15-18 credits from any BIO, BMS, HSC, CHE or PHY course at the 200 level or above. Three courses must be BMS.

## Open Electives

Students may take 6 credits of 1-, 2-, 3-, or 4-credit courses. BMS majors may not take 100-level "science for non-science majors" classes as open electives.

## Minors

Science and open electives may be taken to complete minors from a variety of disciplines such as microbiology/immunology, chemistry and psychology. Students should discuss course selection for minors with their academic adviser.

## Biomedical Sciences Electives

Code	Title	Credits
BMS 200	Biomedical Basis and Experience of Human Aging	3
BMS 221	Physiology and Effects of Obesity in Society	3
BMS 276	Drug Development	3
BMS 278	Research and Technology	3
BMS 299	Biomedical Sciences Journal Club	1
BMS 300 & 300L	The Physiology of Human Performance I and The Physiology of Human Performance I Lab	4

BMS 301 & 301L	Physiology of Human Performance II and Physiology of Human Performance II Lab	4
BMS 310	Neuroanatomy	3
BMS 318	Pathophysiology	3
BMS 319	Public Health: Epidemiology of Infectious Diseases	3
BMS 320	Pharmacology	3
BMS 325	Toxicology	3
BMS 330	Endocrinology	3
BMS 332	Histology and Lab	4
BMS 364	Molecular Mechanisms of Cancer Therapies	3
BMS 370 & 370L	General Microbiology and General Microbiology Lab	4
BMS 372 & 372L	Pathogenic Microbiology and Pathogenic Microbiology Lab	4
BMS 373 & 373L	Mycology and Mycology Lab	4
BMS 375 & 375L	Immunology and Immunology Lab	4
BMS 378	Vaccines and Vaccine-Preventable Diseases	3
BMS 397	Biomedical Sciences Internship	1-4
BMS 470 & 470L	Virology and Virology Lab	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
BMS 498	Independent Study in Biomedical Sciences I	1-4
BMS 499	Independent Study in Biomedical Sciences II	1-4

## Student Learning Outcomes

Upon completion of the Bachelor of Science in Biomedical Sciences program, students will demonstrate the following competencies:

- Foundational Knowledge:** Demonstrate advanced knowledge of the major disciplines in the biomedical sciences (biology, chemistry, physics, physiology, microbiology, immunology, pathophysiology).
- Disease Mechanisms:** Identify factors that influence human health and disease.
- Translational Science:** Critically analyze how new research discoveries can be translated into effective patient treatments/interventions.
- Professional Skills:** Master the essential technical skills critical for success in a laboratory environment.

- 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.

## BMS Mission Statement

The mission of the Biomedical Sciences program is to provide students with a solid basic science foundation in preparation for studying the upper-level biomedical-related sciences. This is meant to provide maximum flexibility to students who are interested in pursuing one of the medical-related professions (e.g., physician, physician assistant, dentist, veterinarian, pharmacist, chiropractor, etc.), or graduate programs (MS/PhD) in the biomedical sciences (e.g., cancer biology, stem cell technology, cloning technology, molecular genetics, microbiology, immunology, etc.). Additionally, 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.

BMS students have the opportunity to learn valuable skills that may be applicable in a variety of biomedical fields after graduation, including effective communication via oral and written expression; exhibition of general fine motor skills and hand-eye coordination appropriate to performing delicate procedures; reading comprehension, critical thinking, visual literacy, interpretation of scientific/medical information from professional sources, etc.

## Admission into the Program

Admission into the Biomedical Sciences 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 Biomedical Sciences program should have a strong background in the biological sciences. To remain in good standing within the program, the student must maintain a GPA of 2.50 overall, as well as in math and science.

## Transfer Students from within Quinnipiac University

Students currently attending Quinnipiac in another program may be accepted into the Biomedical Sciences program based upon a review of qualifications by the program director. Students may apply upon completion of at least one semester at Quinnipiac. 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 must also meet the performance standards of the program (GPA of 2.50 overall, as well as in math and science).

## Transfer Students from Other Colleges and Universities

Transfer students from other colleges and universities may be accepted into the Biomedical Sciences 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 Biomedical Sciences

A minimum of 60 credits is required for transfer into the BS in Biomedical Sciences 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 - Pre-Calculus		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>