

# BACHELOR OF SCIENCE IN BIOLOGY

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The Bachelor of Science in Biology program provides students with a biological, chemical and physical science foundation on which they can build a graduate degree in natural science or education, or it can be used to pursue advanced degrees in the fields of medicine, dentistry, veterinary medicine or other healthcare professions. Those choosing to end their formal education with the bachelor's degree will have a sufficient level of sophistication in biological science to assume a variety of positions with research institutions, governmental agencies or industry.

Students choose courses and follow a curriculum determined in consultation with their adviser.

**A note about Advanced Placement equivalencies:** Students who receive a score of 4 on the AP Biology Exam can receive credit for BIO 101 and BIO 102; these courses also fulfill the UC Natural Sciences requirement. For students majoring in the natural sciences, we strongly encourage students to begin with BIO 150 and BIO 151, regardless of whether they receive credit for BIO 101 and BIO 102.

**Graduation requirements:** Majors in the Department of Biological Sciences must achieve an overall GPA of 2.00 and a science GPA of 2.25 for graduation. The science GPA is calculated from courses with prefixes of BIO, BMS, CHE, PHY and SCI. In addition, courses used to satisfy the Biological Science Core or Biology Elective Requirements must have a minimum grade of C-.

Upon completion of the Bachelor of Science in Biological Sciences, students will demonstrate:

**1. Knowledge and Comprehension: Successful completion of the following objectives establishes that students have achieved an appropriate understanding of foundational biological concepts.**

- Apply critical thinking and the scientific method to community/world issues and decision-making.
- Evaluate the quality and validity of scientific evidence.
- Create an understanding of biology as a whole by integrating and synthesizing information from multiple biological subdisciplines.

**2. Applications and Analysis: Successful completion of the following objectives demonstrates that students have the ability to apply foundational knowledge and analyze information/data to make meaning from it.**

- Demonstrate basic skills and an understanding of safety procedures in the field and/or laboratory.
- Organize and interpret experimental data (from their own experiments and/or those in primary literature sources).
- Design and perform well-controlled experiments.

**3. Self and Society: Successful completion of the following objectives indicates that students successfully utilize biological knowledge to present and defend opinions in a variety of arenas.**

- Develop an in-depth understanding of the complexity of the natural world by understanding how a biologist thinks about complex systems.

- Apply scientific methodology and knowledge of biological facts to real-world problems.

The Department of Biological Sciences is committed to supporting experiential learning, which enables students to apply their biology knowledge and expertise outside the classroom, explore possible career options, and make professional connections all while pursuing a custom-designed project or experience. Projects/experiences might include shadowing a professional, research off campus, summer research on campus (e.g. QUIP-RS), community-based service or research, internships, study abroad/away or travel abroad experiences, or creative, co-curricular or other works on or off campus.

All Biology majors are required to complete an Experiential Learning course. Experiential Learning courses include BIO 385, "Explorations in Biology", BIO 491-494, "Independent Research in Biological Sciences", and pre-approved travel courses.

1. Independent Study cannot be used to satisfy departmental requirements other than Experiential Learning.
2. Students may not exceed a total of 8 credits of Experiential Learning courses while completing their undergraduate work.

A list of the department faculty and their research interests is available on the CAS360 website. (<https://cas360.qu.edu/department-of-biological-sciences-research/>)

More information about Experiential Learning in Biology is available on the CAS360 website (<https://cas360.qu.edu/resources/understanding-experiential-learning-in-biology/>).

Students majoring in biology must meet the following requirements for graduation. The minimum number of credits required for graduation is 120.

Code	Title	Credits
<b>Biological Science Core Requirements</b>		
BIO 150 & 150L	General Biology for Majors and General Biology for Majors Laboratory	4
BIO 151 & 151L	Molecular and Cell Biology and Genetics and Molecular and Cell Biology and Genetics Lab	4
BIO 252 & 252L	Ecology and Biodiversity and Ecology and Biodiversity Laboratory	4
BIO 298	Research Methods in Biology	3
<b>Biology Electives<sup>1</sup></b>		
Select a minimum of one course from each of the following categories:		10-16
<b>Molecular and Cellular Electives (3-4 credits):<sup>1</sup></b>		
BIO 240	Cellular Communication	
BIO 282 & 282L	Genetics and Genetics Lab	
BIO 317 & 317L	Developmental Biology and Developmental Biology Lab	
BIO 346 & 346L	Cell Physiology and Cell Physiology Lab	
BIO 365	Cancer Biology	

BIO 382 & 382L	Human Genetics and Human Genetics Lab	
BIO 471 & 471L	Molecular Genetics and Molecular Genetics Lab	
<b>Organismal Electives (3-4 credits) <sup>1</sup></b>		
BIO 215	Environmental Biotechnology	
BIO 300	Special Topics	
BIO 323 & 323L	Invertebrate Zoology and Invertebrate Zoology Lab	
BIO 324 & 324L	Vertebrate Zoology and Vertebrate Zoology Lab	
BIO 328 & 328L	Human Clinical Parasitology and Human Clinical Parasitology Lab	
BIO 352 & 352L	Botany and Botany Lab	
BIO 358 & 358L	Conservation Biology and Conservation Biology Lab	
BIO 375 & 375L	Physiological Models for Human Disease and Physiological Models for Human Disease Lab	
BIO 383	Evolution	
<b>Physiology Electives (3-4 credits): <sup>1</sup></b>		
BIO 211 & 211L	Human Anatomy and Physiology I and Human Anatomy and Physiology Lab I	
BIO 212 & 212L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Lab	
BIO 225 & 225L	Physiological Diversity and Physiological Diversity Lab	
BIO 329	Neurobiology	
BIO 350	Cardiovascular Physiology	
<b>Experiential Learning (1-4 credits):</b>		
BIO 385	Explorations in Biology	
BIO 491	Independent Research in Biological Science	
BIO 492	Independent Research in Biological Sciences	
BIO 493	Independent Research in Biological Sciences	
BIO 494	Independent Research in Biological Sciences	
<b>Physical Science Core Requirements</b>		
CHE 110 & 110L	General Chemistry I and General Chemistry I Lab	4
CHE 111 & 111L	General Chemistry II and General Chemistry II Lab	4
CHE 210 & 210L	Organic Chemistry I and Organic Chemistry I Lab	4
CHE 211 & 211L	Organic Chemistry II and Organic Chemistry II Lab	4
PHY 110 & 110L	General Physics I and General Physics I Lab	4

PHY 111 & 111L	General Physics II and General Physics II Lab	4
<b>Modern Language Requirement <sup>2</sup></b>		<b>3-6</b>
<b>University Curriculum <sup>3</sup></b>		<b>46</b>
<b>Open Electives <sup>4</sup></b>		<b>21</b>
<b>Total Credits</b>		<b>119-128</b>

<sup>1</sup> **Biology Electives:** Some biology courses have no laboratory component and are 3-credit rather than 4-credit courses. Co-requisite courses must be taken simultaneously.

<sup>2</sup> **College of Arts and Sciences Modern Language Requirement:** All CAS students (both bachelor of science and bachelor of arts) must complete one modern language through the 102 level. Modern language courses may also count toward the UC Personal Inquiry II requirement. Students who have taken a language in high school should take the modern language placement test for that language. Students with placement scores at the 201 level or higher have demonstrated language competency and thus have passed out of the language requirement.

<sup>3</sup> **University Curriculum Requirement:** All students must complete the 46 credits of the University Curriculum (<https://catalog.qu.edu/academics/university-curriculum/>). A minimum of MA 141 is required for the Bachelor of Science degree in Biology. The following courses taken for the Biology major double count as UC requirements: BIO 150 & 150L, BIO 151 and 151L, CHE 110 & 110L, CHE 111 & 111L, and PHY 110 & 110L.

<sup>4</sup> **Open Electives:** Students take open electives for a total of 120 credits required for the Bachelor of Science degree in Biology. Many students pursue other interests by selecting electives in fulfillment of a minor or making plans to study abroad.

Shown below is one of many possible paths through the curriculum. Individual planning will vary based on a number of factors (e.g., Advanced Placement and/or transfer credits); each student's individual academic plan is crafted in consultation with their academic adviser.

A minimum of 120 credits is required for the Bachelor of Science degree in Biology.

Code	Title	Credits
<b>First Year</b>		
Milestones: Earn 30 credits, meet with your advisor at least once a semester, and an overall GPA of 2.0 or higher, and a science GPA of 2.25.		
<b>Fall Semester</b>		
BIO 150 & 150L	General Biology for Majors and General Biology for Majors Laboratory	4
CHE 110 & 110L	General Chemistry I and General Chemistry I Lab	4
EN 101	Introduction to Academic Reading and Writing <sup>1</sup>	3
FYS 101	First-Year Seminar	3
Open Electives		1-2
<b>Spring Semester</b>		
BIO 151 & 151L	Molecular and Cell Biology and Genetics and Molecular and Cell Biology and Genetics Lab	4

CHE 111 & 111L	General Chemistry II and General Chemistry II Lab	4
EN 102	Academic Writing and Research	3
MA 140	Pre-Calculus <sup>1</sup>	3
Open Electives		1-2

**Second Year**

Milestones: Earn 60 credits, and an overall GPA of 2.0 or higher, and a science GPA of 2.25. Meet with your advisor at least once per semester to discuss academic, experiential learning, career, and co-curricular opportunities.

**Fall Semester**

BIO 252 & 252L	Ecology and Biodiversity and Ecology and Biodiversity Laboratory <sup>2</sup>	4
CHE 210 & 210L	Organic Chemistry I and Organic Chemistry I Lab	4
MA 141	Calculus of a Single Variable	3
Language at the 101 level		3
Open Electives		1-2

**Spring Semester**

BIO 298	Research Methods in Biology <sup>2</sup>	3
CHE 211 & 211L	Organic Chemistry II and Organic Chemistry II Lab	4
Language at the 102 level (satisfies CAS language requirement)		3
University Curriculum (UC) course		3
Open Electives		2-3

**Third Year**

Milestones: Earn 90 credits, and an overall GPA of 2.0 or higher, and a science GPA of 2.25. Meet with your advisor at least once per semester. Participate in study abroad, complete internship or research opportunities.

**Fall Semester**

Biology Elective		3-4
PHY 110 & 110L	General Physics I and General Physics I Lab	4
University Curriculum (UC) course		3
University Curriculum (UC) course		3
Open Electives		2-3

**Spring Semester**

Biology Elective		3-4
PHY 111 & 111L	General Physics II and General Physics II Lab	4
University Curriculum (UC) course		3
University Curriculum (UC) course		3
Open Electives		2-3

**Fourth Year**

Milestones: Earn 120 credits, and an overall GPA of 2.0 or higher, and a science GPA of 2.25. Complete possible minor or double major and prepare for graduation.

**Fall Semester**

Biology Elective		3-4
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Open Elective		3
Open Elective		3
Open Elective		3
Open Elective		3

**Spring Semester**

Biology Elective (Experiential Learning)		1-4
CAS 420	CAS Integrative Capstone	3
Open Elective		3
Open Elective		3
Open Elective		3
Open Electives		2-3

**Total Credits** **120-133**

<sup>1</sup> Initial placement in the English and mathematics courses is determined by placement exam and an evaluation of high school units presented. Students intending to pursue graduate or professional studies (medicine, dentistry, osteopathy or veterinary medicine) are advised to complete at least one semester of calculus. A minimum of MA 141 is required for the Bachelor of Science degree in Biology.

<sup>2</sup> Students may take either BIO 252 and BIO 252L or BIO 298 in either order or concurrently.

## Honors in Biology Requirements

1. A cumulative GPA of 3.00 and an overall GPA of 3.50 in all BIO courses are required.
2. Departmental honors students are required to take BIO 399H (3 credits; Honors Seminar in Bio Sciences) in the Fall semester of their final year of undergraduate study.
3. Successful completion of a senior research project under the supervision and sponsorship of a full-time faculty member in the Department of Biological Sciences is required. The project must include:
  - a. A written proposal;
  - b. A written report on the outcome of the research project;
  - c. A presentation of the outcome of the research project#.

## To Apply

Students must submit the form with their intention to pursue honors in biology no later than their registration date one year BEFORE they graduate with a bachelor's degree.

## #Granting of Honors

Evidence of excellence in speaking and writing skills, documented by term papers, written work, oral presentations and grades, will be determined by the committee. The granting of honors in biology is determined by all full-time faculty in the Department of Biological Sciences.

## National Biological Honors Societies

### Beta Beta Beta National Biological Honor Society (Upsilon Chapter)

The Beta Beta Beta (TriBeta) Biological Sciences Honor Society is a national honor society for students, particularly undergraduates, dedicated to improving the understanding and appreciation of biological study and extending boundaries of human knowledge

through scientific research. Since its founding in 1922, more than 200,000 persons have been accepted into the lifetime membership, and more than 626 chapters have been established throughout the United States and Puerto Rico. Undergraduate biology students are invited to become members after the completion of three semesters, in which they have maintained a B average in biology courses and all other courses.

An award is given to the graduating senior in the Department of Biological Sciences who is a member of Beta Beta Beta National Honor Society and who has attained the highest academic standing.

## Phi Sigma

The Phi Sigma Biological Sciences Honor Society is a national honor society that promotes research and academic excellence in the biological sciences. Undergraduate students are invited to become members if they have achieved junior status, are in the top 30 percent of their class and are actively engaged in, or have participated in, research at Quinnipiac University under the direct supervision of a Quinnipiac faculty member in an area related to the biological sciences.

Listing of all University Honors Societies and Awards (<https://catalog.qu.edu/academic-awards-honor-societies/#honorsocietiestext>)

## 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 Biology

A minimum of 60 credits is required for transfer into the BS in Biology 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 I		3
General Biology I with Lab		4
General Chemistry I 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 or Genetics with Lab		4
General Physics I with Lab or Organic Chemistry I with Lab		4
Elective		3
Elective		3
<b>Credits</b>		<b>14</b>
<b>Spring Semester</b>		
Anatomy & Physiology I or II with Lab or Genetics with Lab		4
General Physics II with Lab or Organic Chemistry II with Lab		4
Elective		4
Elective		3
<b>Credits</b>		<b>15</b>
<b>Total Credits</b>		<b>60</b>

## Admission Requirements: College of Arts and Sciences

The requirements for admission into the undergraduate College of Arts and Sciences programs are the same as those for admission to Quinnipiac University.

Admission to the university is competitive, and applicants are expected to present a strong college prep program in high school. Prospective first-year students are strongly encouraged to file an application as early in the senior year as possible, and arrange to have first quarter grades sent from their high school counselor as soon as they are available.

For detailed admission requirements, including required documents, please visit the Admissions (<http://catalog.qu.edu/general-information/admissions/>) page of this catalog.