BIOCHEMISTRY MAJOR

Overview

Biochemistry is a highly interdisciplinary science that focuses on the study of the chemistry of living systems and understanding their structure and function at the molecular level. In particular, biochemistry lays the foundation for deciphering the mechanisms involved in many diseases that plague the world. Students will learn how biomolecules such as proteins, nucleic acids, fats, lipids, and carbohydrates interact in biological processes, and how structures of these biomolecules relate to function and regulation of metabolic pathways in cells, tissues, and organisms as a whole.

The biochemistry major will prepare students to be the next generation of scientists with a broad range of career options in biotechnology, molecular and cellular biochemistry, medicine, bioengineering, and pharmacology, as well as in allied health fields, including clinical biochemistry, forensic science, the physician associate profession, cosmeics, food technology, and nursing.

The program will also lay a foundation for students to compete for positions in top graduate programs and professional schools in medicine, biomedical engineering, and biomedical sciences.

CIP Code
26.0202 - Biochemistry.
You can use the CIP code to learn more about career paths associated with this field of study and, for international students, possible post-graduation visa extensions. Learn more about CIP codes and other information resources.

Requirements

The biochemistry major is offered in two tracks (p. 2): an American Chemical Society (ACS)-certified track (p. 3) and a general track (p. 2).

Students interested in pursuing courses with an emphasis on chemistry in relation to physical, analytical, and advanced structural and molecular aspects of biochemistry may choose to opt for the ACS track. On the other hand, students inclined more toward cell, molecular, and structural aspects of biochemistry in addition to biocomputational and physiological approaches may pursue the general track. Both tracks require students to participate in research.

Students interested in pursuing more in-depth organic chemistry laboratory coursework have the option of taking CHEM 2531 Organic Chemistry Lab I for Chem Majors and CHEM 2532 Organic Chemistry Lab II for Chem Majors in lieu of CHEM 2541 and CHEM 2542.

Research courses (CHEM 1990 Introduction to Research, CHEM 3990 Directed Research, and CHEM 4990 Independent Research) are available. Students should contact specific faculty for research opportunities based on their research interests.

Chemistry majors and biological sciences majors may not double major in biochemistry, but they may pursue a biochemistry minor. Integrative neuroscience majors pursuing a concentration in systems/computational neuroscience or in cognitive neuroscience may double major in biochemistry. However, integrative neuroscience majors pursuing a concentration in cell and molecular neuroscience may not double major in biochemistry.

A minimum grade of C or higher is required in the following foundational course sequences (lecture and lab) listed below: general chemistry, biology, organic chemistry, and mathematics.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td><strong>Foundational Courses</strong></td>
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<tr>
<td><strong>General Chemistry</strong></td>
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<td>Select one of the following (Rose Hill students take CHEM; Lincoln Center students take NSCI):</td>
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<td>CHEM 1321 General Chemistry I &amp; &amp; CHEM 1331 and General Chemistry Lab I</td>
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<td>&amp; &amp; CHEM 1311 and General Chemistry I Recitation</td>
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<td>NSCI 1321 General Chemistry Lecture I &amp; &amp; NSCI 1331 and General Chemistry Lab I</td>
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<td>CHEM 1322 General Chemistry II &amp; &amp; CHEM 1332 and General Chemistry Lab II</td>
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<td>&amp; &amp; CHEM 1312 and General Chemistry II Recitation</td>
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<tr>
<td>NSCI 1322 General Chemistry Lecture II &amp; &amp; NSCI 1332 and General Chemistry Lab II</td>
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<td><strong>Biology</strong></td>
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<td>BISC 1403 Introductory Biology I &amp; &amp; BISC 1413 and Introductory Biology Lab I</td>
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<td>NSCI 1403 General Biology Lecture I &amp; &amp; NSCI 1413 and General Biology Lab I</td>
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<td>NSCI 1423 Concepts in Biology Lecture I &amp; &amp; NSCI 1433 and Concepts in Biology Lab I</td>
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<td>Select one of the following (Rose Hill students take BISC; Lincoln Center students take NSCI):</td>
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<td>BISC 1404 Introductory Biology II &amp; &amp; BISC 1414 and Introductory Biology Lab II</td>
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<td>NSCI 1404 General Biology Lecture II &amp; &amp; NSCI 1414 and General Biology Lab II</td>
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<td>NSCI 1424 Concepts in Biology Lecture II &amp; &amp; NSCI 1434 and Concepts in Biology Lab II</td>
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<td><strong>Organic Chemistry</strong></td>
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<td>CHEM 2521 Organic Chemistry I &amp; &amp; CHEM 2541 and Organic Chemistry Lab I</td>
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<td>&amp; &amp; CHEM 2511 and Organic Chemistry I Recitation</td>
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<tr>
<td>CHEM 2521 Organic Chemistry I &amp; &amp; CHEM 2531 and Organic Chemistry Lab I for Chem &amp; &amp; CHEM 2511 Majors</td>
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<td>&amp; &amp; CHEM 2511 and Organic Chemistry I Recitation</td>
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<td>NSCI 3121 Organic Chemistry Lecture I &amp; &amp; NSCI 3821 and Organic Chemistry Lab I</td>
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<td>Select one of the following (Rose Hill students take CHEM; Lincoln Center students take NSCI):</td>
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<td>CHEM 2522 Organic Chemistry II &amp; &amp; CHEM 2542 and Organic Chemistry Lab II</td>
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<td>&amp; &amp; CHEM 2512 and Organic Chemistry II Recitation</td>
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CHEM 2522 & CHEM 2532 & CHEM 2512
Organic Chemistry II and Organic Chemistry Lab II for Chem Majors and Organic Chemistry II Recitation
NSCI 3122 & NSCI 3822
Organic Chemistry Lecture II and Organic Chemistry Lab II

Mathematics
MATH 1206 Calculus I 4
MATH 1207 Calculus II 4

Physics
Select one of the following (Rose Hill students take PHYS; Lincoln Center students take NSCI):
PHYS 1501 & PHYS 1511 & PHYS 1503
General Physics I and Physics I Lab and General Physics I Recitation
PHYS 1601 & PHYS 1511 & PHYS 1603
Introduction to Physics I and Physics I Lab and Introduction to Physics I Recitation
PHYS 1701 & PHYS 1511 & PHYS 1703
Physics I and Physics I Lab and Physics I Recitation
NSCI 1501 & NSCI 1511
General Physics Lecture I and General Physics Lab I
Select one of the following (Rose Hill students take PHYS; Lincoln Center students take NSCI):
PHYS 1502 & PHYS 1512 & PHYS 1504
General Physics II and Physics II Lab and General Physics II Recitation
PHYS 1602 & PHYS 1512 & PHYS 1604
Introduction to Physics II and Physics II Lab and Introduction to Physics II Recitation
PHYS 1702 & PHYS 1512 & PHYS 1704
Physics II and Physics II Lab and Physics II Recitation
NSCI 1502 & NSCI 1512
General Physics Lecture II and General Physics Lab II

Track Courses
Select one of the following:
General Track
ACS Track

1 Students interested in the ACS track should complete Calculus I (MATH 1206) and Calculus II (MATH 1207) as early as possible in their studies. A score of 4 or 5 in AP Calculus AB or BC, or an IB HL Mathematics (Analysis and Approaches) score of 6 or 7, fulfills the Calculus I requirement.

2 Consult the Tracks section (p. 2) for the required and elective courses that comprise each track.

Availability
The major in biochemistry is available at Fordham College at Rose Hill and at Fordham College at Lincoln Center. Students in Fordham’s School of Professional and Continuing Studies may major in biochemistry only if they receive the approval of their advising dean and/or department, and their schedules are sufficiently flexible to permit them to take day courses at the Rose Hill or Lincoln Center campuses. Students should note that many of the courses that comprise the major are offered only at the Rose Hill campus.

Tracks
General track
Course Title Credits
Required Courses
CHEM 4221 Biochemistry I 4
& CHEM 4231 and Biochemistry Lab I
CHEM 4222 Biochemistry II 3
CHEM 3141 Methods of Biochemical Research (also fulfills Eloquentia Perfecta 3 requirement for the Core Curriculum) 3
CHEM 4251 Physical and Computational Models of Biochemical Systems 3
CHEM 4030 Chemistry Seminar (taken in both semesters of junior and senior years, four times total) 0
Select one of the following (Rose Hill students take BISC; Lincoln Center students take NSCI):
BISC 2539 & BISC 2549 General Genetics and General Genetics Lab
NSCI 3133 Genetics Lecture
Select one of the following (Rose Hill students take BISC; Lincoln Center students take NSCI):
BISC 3752 Molecular Biology
NSCI 4176 & NSCI 4876 Molecular Biology Lecture and Molecular Biology Lab
Elective Courses
Select two of the following: 6 to 12
BISC 3132 & BISC 3142 Human Physiology and Human Physiology Lab
BISC 3754/NSCI 3154 Cell Biology (Rose Hill students take BISC; Lincoln Center students take NSCI)
BISC 3893 Introduction to Virology
BISC 4530 Cancer Biology and Signaling
CHEM 3621 & CHEM 3631 Physical Chemistry I and Physical Chemistry Lab I
CHEM 3622 & CHEM 3632 Physical Chemistry II and Physical Chemistry Lab II
CHEM 3721 Quantitative Analysis or CHEM 3722 Instrumental Analysis
CHEM 4241 Biomimetic Chemistry
CHEM 4621 Bionanotechnology and Introduction to Nanomedicine
NSCI 4081 Neurochemistry

1 Only one Physical Chemistry sequence (CHEM 3621 Physical Chemistry I and CHEM 3631 Physical Chemistry Lab I or CHEM 3622 Physical Chemistry II and CHEM 3632 Physical Chemistry Lab II) may count towards the major.

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### American Chemical Society (ACS) track

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<td>&amp; CHEM 4231</td>
<td>and Biochemistry Lab I</td>
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<td>or CHEM 3722</td>
<td>Instrumental Analysis</td>
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<tr>
<td>CHEM 4422</td>
<td>Inorganic Chemistry</td>
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<tr>
<td>CHEM 4030</td>
<td>Chemistry Seminar (taken in both</td>
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<td>semesters of junior and senior years,</td>
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<td>four times total)</td>
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*Select one of the following:*

- CHEM 3621 Physical Chemistry I
- & CHEM 3631 and Physical Chemistry Lab I

- CHEM 3622 Physical Chemistry II
- & CHEM 3632 and Physical Chemistry Lab II

**Select one of the following (Rose Hill students take BISC; Lincoln Center students take NSCI):**

- BISC 2539 General Genetics
- & BISC 2549 and General Genetics Lab

- NSCI 3133 Genetics Lecture

**Select one of the following (Rose Hill students take BISC; Lincoln Center students take NSCI):**

- BISC 3752 Molecular Biology
- & NSCI 4176 and Molecular Biology Lecture

**Elective Courses**

**Select one of the following:**

- BISC 3132 Human Physiology
- & BISC 3142 and Human Physiology Lab

- BISC 3754/NSCI 3154 Cell Biology (Rose Hill students take BISC; Lincoln Center students take NSCI)

- BISC 3893 Introduction to Virology

- BISC 4530 Cancer Biology and Signaling

- CHEM 3141 Methods of Biochemical Research (also fulfills Eloquenta Perfecta 3 requirement for the Core Curriculum)

- CHEM 4241 Biomimetic Chemistry

- CHEM 4251 Physical and Computational Models of Biochemical Systems

- CHEM 4621 Bionanotechnology and Introduction to Nanomedicine

- NSCI 4081 Neurochemistry

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