BIOPHYSICS, BA

Bridging the biological sciences and the physical sciences, Biophysics is concerned with physical and chemical explanations of living processes, especially at the cellular and molecular levels. Detailed molecular descriptions are emerging for genetic elements and the mechanisms that control their propagation and expression. Biophysical studies include the investigation of protein structure, nucleic acid structure, enzyme mechanisms, the phenomena underlying cellular behavior, excitable phenomena in nerve, muscle and visual cells, and integrative neural phenomena.

The minimum total course units (https://www.college.upenn.edu/credits-needed-major/) for graduation in this major is 36. Double majors may entail more course units.

Note: Though not a requirement of the major, participation in an independent research project is strongly encouraged.

For more information: https://www.physics.upenn.edu/biophysics/

For information about the General Education requirements, please visit the College of Arts & Sciences Curriculum (https://www.college.upenn.edu/curriculum/) page.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Course Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Foundational Approaches + Sectors</strong>¹ + Free Electives</td>
<td>16</td>
</tr>
</tbody>
</table>

**Major Requirements**

**Cell Biology and Biochemistry**

- BIOL 204 Biochemistry 1
- or CHEM 251 Principles of Biological Chemistry 1

- BIOL 205 Cell Biology 1

**Biophysics**

- PHYS 280 Physical Models of Biological Systems 1
- or BCHE 280 Physical Models of Biological Systems 1

Select 1 course unit or two .5 course units of electives 1

**Chemistry**

- CHEM 101 General Chemistry I 1
- or CHEM 115 Honors Chemistry I 1

- CHEM 102 General Chemistry II 1
- or CHEM 116 Honors Chemistry II 1

Select one of the following lab sequences: 1

- CHEM 053 General Chemistry Laboratory I
- CHEM 054 General Chemistry Laboratory II

OR

- CHEM 244 Experimental Organic Chemistry Lab I
- CHEM 249 Experimental Organic Chemistry Laboratory II

- CHEM 241 Principles of Organic Chemistry 1

- CHEM 242 Principles of Organic Chemistry II
- or CHEM 243 Organic Chemistry II: Principles of Org Chem with applications in Chem Biology 1

Select one of the following: 2

- CHEM 221 Physical Chemistry I
- CHEM 222 Physical Chemistry II

**Math**

- MATH 104 Calculus, Part I 1
- Select one of the following: 1
  - MATH 114 Calculus, Part II
  - MATH 115 Calculus, Part II with Probability and Matrices
  - MATH 116 Honors Calculus
  - MATH 240 Calculus, Part III
  - or MATH 260 Honors Calculus, Part II
  - MATH 241 Calculus, Part IV 1

**Physics**

- PHYS 150 Principles of Physics I: Mechanics and Wave Motion 1.5
- or PHYS 170 Honors Physics I: Mechanics and Wave Motion

Select one of the following: 1.5

- PHYS 151 Principles of Physics II: Electromagnetism and Radiation
- or PHYS 171 Honors Physics II: Electromagnetism and Radiation

- PHYS 361 Electromagnetism I: Electricity and Potential Theory 1
- or PHYS 561 Electromagnetism I

- PHYS 362 Electromagnetism II: Magnetism, Maxwell's Equations, and Electromagnetic Waves 1
- or PHYS 562 Electromagnetism II: Magnetism, Maxwell’s Equations, and Electromagnetic Waves

**Total Course Units** 36

¹ You may count no more than one course toward both a Major and a Sector requirement. For Exceptions, check the Policy Statement (http://www.college.upenn.edu/sectors-policy/).

**Honors**

Applicant must have a minimum GPA of 3.3 in the major. Thesis required.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2021 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.