BIOPHYSICS (BS)

The Biophysics major is an interdisciplinary program on the cutting edge of new developments in the biosciences. Offered by the Departments of Physics and Biology, the biophysics major provides rigorous training in biosciences, mathematics, and lab skills. The degree prepares students for research careers in biophysics, biochemistry, biomedical engineering, and physics. Biophysics is an ideal major for students considering careers in medicine, optometry, dentistry, and other applied health sciences.

Curriculum

This course of study prepares one for careers in medicine, medical research, nano-sciences, biophysics, medical physics, biomedical engineering, and biotechnology. A strong physics and mathematics background is fortified with biology and chemistry classes. The courses required of this program as of the 2022-2023 Academic Year are:

- A minimum grade of C- must be earned to satisfy a course requirement and a 2.0 minimum overall GPA is required for each

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>PHYS 121</td>
<td>College Physics I Lec/Dis</td>
<td>3</td>
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<tr>
<td>PHYS 111L</td>
<td>College Physics Laboratory I</td>
<td>1</td>
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<tr>
<td>PHYS 122</td>
<td>College Physics II Lec/Dis</td>
<td>3</td>
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<td>PHYS 126F</td>
<td>Freshman Projects</td>
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<tr>
<td>PHYS 112L</td>
<td>College Physics Lab II</td>
<td>1</td>
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<tr>
<td>PHYS 235</td>
<td>Modern Physics</td>
<td>3</td>
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<tr>
<td>PHYS 235L</td>
<td>Modern Physics Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 301</td>
<td>Mathematical Methods in Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 314</td>
<td>Theoretical Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 351</td>
<td>Electricity and Magnetism I</td>
<td>3</td>
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Physics Elective

Select one of the following: 3

- PHYS 310 Optics
- PHYS 328 Thermal Phys & Stat Mechanics
- PHYS 361 Quantum Mechanics I

Biology

Select one of the following: 1-3

- BIOL 101 General Biology I
- BIOL 111 General Biology I Lab
- BIOL 251 Cell Biology
- BIOL 282 Genetics

Biophysics Elective Options

Students must complete 10 credit hours to fulfill this requirement from the following:

- BIOL 102 General Biology II 1
- or COMP 181 Computing and Data Analysis for the Sciences
- BIOL 112 General Biology II Lab
- BIOL 252 Cell Biology Laboratory
- BIOL 283 Genetics Laboratory
- BIOL 317 Models of Human Disease

BIOL 335 / STAT 335 Intro to Biostatistics

- BIOL 366 Cell Physiology & Biochemistry
- BIOL 366L Cell Physiology & Biochemistry Lab
- BIOL 387 Genomics
- BIOL 388 Bioinformatics
- BIOL 390 Molecular Biology Laboratory
- BIOL 382 Molecular Genetics
- COMP 180 Computing and Data Analysis for the Sciences 1
- PHYS 130 Introduction to Computational Physics 1
- PHYS 310L Optics Lab
- PHYS 338 Advanced Physics Laboratory
- PHYS 371 Biophysics
- PHYS 391 Research 2

General Chemistry A: Lecture, Discussion & Lab

- CHEM 101 General Chemistry A Lecture/Discussion 4
- CHEM 111 General Chemistry Lab A

General Chemistry B: Lecture, Discussion & Lab

- CHEM 102 General Chemistry B Lecture/Discussion 4
- CHEM 112 General Chemistry Lab B 3

Organic Chemistry A: Lecture, Discussion & Lab

- CHEM 223 Organic Chemistry A Lect & Disc 4
- CHEM 225 Organic Chemistry Lab A 4

Organic Chemistry B: Lecture, Discussion & Lab

- CHEM 224 Organic Chem B Lect/Disc 4
- CHEM 226 Organic Chemistry Lab B 5

Mathematics

- MATH 161 Calculus I 4
- MATH 162 Calculus II 4
- MATH 263 Multivariable Calculus 4
- MATH 264 Ordinary Differential Equations 3

Total Hours 67-69

1 Students may receive degree credit for only one of the following: BIOL 102, COMP 180, or PHYS 130.
2 Students may only count 1 credit hour of PHYS 391 Research toward the degree.
3 CHEM 106 Basic Inorganic Chemistry may be substituted
4 CHEM 221 Organic Chem I Lect/Disc may be substituted
5 CHEM 222 Organic Chem II Lect/Disc may be substituted

This Academic Requirements Outline lists the approved courses for the plan of study during the indicated Catalog Year and is intended for use by prospective students. A current Loyola student’s requirements are based on when the major or minor was officially declared, and may differ from what is shown here. Loyola students should refer to My Academic Requirements in LOCUS for their individualized lists of approved courses. Final confirmation of all degree requirements is subject to department, school, and university approval.

College of Arts and Sciences Graduation Requirements

All Undergraduate students in the College of Arts and Sciences are required to take two Writing Intensive courses (6 credit hours) as well as complete a foreign language requirement at 102-level or higher (3 credit
hours) or a language competency test. More information can be found here (https://www.luc.edu/cas/college-requirements/).

**Additional Undergraduate Graduation Requirements**

All Undergraduate students are required to complete the University Core, at least one Engaged Learning course, and UNIV 101. SCPS students are not required to take UNIV 101. You can find more information in the University Requirements (https://catalog.luc.edu/undergraduate/university-requirements/) area.

**Learning Outcomes**

Loyola University Chicago’s new biophysics major is an interdisciplinary program on the cutting edge of new developments in the sciences. Offered by the Departments of Physics and Biology, the biophysics major provides rigorous training in mathematics and science and prepares students for graduate education in biophysics, biochemistry, biomedical engineering, and physics. Biophysics is also an ideal major for students considering careers in medicine, optometry, dentistry, and other applied health sciences, such as physical or radiation therapy.

Students majoring in biophysics may pursue careers in medical centers, research institutes, and government labs. They may also focus on research and development in the areas of biotechnology, nanotechnology, medical physics, forensic science, environmental science, agricultural science, pharmaceutical, and other biologically-oriented, high-tech industries, as well as in regulation and public policy at state and federal government agencies. Biophysics students may also obtain jobs with numerous private organizations.

The application of physics to biology and medicine has occurred for more than three centuries, and in the past three decades, biophysics research and applications have grown exponentially. Upon completion of this program, students will:

- Exhibit foundational knowledge in both the biological and physical sciences
- Develop a deeper understanding of the connection between the biological and the physical sciences
- Understand laboratory techniques used in biological and physical science labs
- Possess an understanding of the intermediate level mathematics needed to model and solve problems based in the physical and biological sciences
- Recognize how careful data collection and analysis helps develop or falsify scientific theories
- Demonstrate effective and ethical decision-making abilities in issues related to the sciences

Loyola is one of the handful of universities in the nation that offer this major at the undergraduate level.