BIOMEDICAL PHYSICS (B.S.)

Biomedical Physics deals with applications of physics to questions of biology and medicine. It is an interdisciplinary program, combining courses from physics, biology and medicine designed to train students to use quantitative, physical science inspired approaches to problems of the life sciences. Graduates of this program will be prepared for careers or graduate studies in biophysics, medicine, biomedical engineering, medical physics or any other field requiring physical and technological approaches to medical or biological questions.

Admission Requirements

Admission requirements for this program are satisfied by the general requirements for undergraduate admission (http://bulletins.wayne.edu/undergraduate/general-information/admission) to the University. In addition, a student must possess an overall g.p.a. of at least 3.0 for the following four courses to become a B.S. candidate in Biomedical Physics:

Select one of the following: 10

Option 1
- PHY 2130 (PS) Physics for the Life Sciences I
  & PHY 2131 Physics for the Life Sciences Laboratory
  
- PHY 2140 (PS) Physics for the Life Sciences II
  & PHY 2141 Physics for the Life Sciences Laboratory

Option 2
- PHY 2170 (PS) University Physics for Scientists I
  & PHY 2171 University Physics Laboratory
  
- PHY 2180 University Physics for Scientists II
  & PHY 2181 University Physics Laboratory II

MAT 2010 Calculus I
MAT 2020 Calculus II

Candidates must complete at least 123 credits in course work including satisfaction of the University General Education Requirements (http://bulletins.wayne.edu/undergraduate/general-information/general-education) and the College of Liberal Arts and Sciences Group Requirements (http://bulletins.wayne.edu/undergraduate/college-liberal-arts-sciences/bachelors-degree-requirements), as well as the Departmental major requirements cited below. All course work must be completed in accordance with the regulations of the University (http://bulletins.wayne.edu/undergraduate/general-information/academic-regulations) governing undergraduate scholarship and degrees. All students will be required to maintain an overall grade point average of ‘C’ (2.0) for all degree work elected, as well as a grade point average of at least 2.5 in all major and cognate requirements.

Major Requirements

B.S. candidates must take a minimum of 41 credits including:

PHY 2130 (PS) Physics for the Life Sciences I 4
or PHY 2170 (PS) University Physics for Scientists I

PHY 2131 Physics for the Life Sciences Laboratory 1
or PHY 2171 University Physics Laboratory

PHY 2140 (PS) Physics for the Life Sciences II 4
or PHY 2180 University Physics for Scientists II

PHY 2141 Physics for the Life Sciences Laboratory 1

or PHY 2181 University Physics Laboratory II

or PHY 2171 University Physics Laboratory

Select one of the following:

- PHY 3700 Mathematics for Biomedical Physics 4
- PHY 3750 Introduction to Computational Methods 1
- PHY 4700 Introduction to Biomedical Physics 4
- PHY 5340 Optics 5
  & PHY 5341 Optics Laboratory
- PHY 5620 Electronics and Electrical Measurements 5
  & PHY 5621 and Electronics and Electrical Measurements Laboratory
- PHY 5750 Biological Physics 4
- PHY/ROC 6710 Physics in Medicine 3
- PHY 6750 Applied Computational Methods 2
- PHY 6780 (WI) Research Methods in Biomedical Physics 3

Total Credits 41

Cognate Requirements

B.S. candidates in Biomedical Physics must take:

MAT 2010 Calculus I 4
MAT 2020 Calculus II 4
CHM 1220 (PS) General Chemistry I 5
  & CHM 1230 and General Chemistry I Laboratory
CHM 1240 Organic Chemistry I 5
  & CHM 1250 and Organic Chemistry I Laboratory

Select one of the following:

- CHM 2280 General Chemistry II: Analytical Chemistry 5
  & CHM 2290 and General Chemistry II: Analytical Chemistry Laboratory
- CHM 2220 Organic Chemistry II 5
  & CHM 2230 and Organic Chemistry II Laboratory
BIO 1500 Basic Life Diversity (or approved BIO elective) 4
BIO 1510 (LS) Basic Life Mechanisms 4

Total Credits 31

Some of these courses can be waived with the approval of the Biomedical Physics Advisor if a proof of proficiency is provided or a higher level course is substituted.

Science Electives

B.S. candidates in Biomedical Physics must take a total of four additional science, mathematics, engineering, or computer science elective classes beyond the requirements listed above. At least one of these classes must come from the field of biology. These four classes can be chosen from the following list:

BIO 2200 (LS) Introductory Microbiology 5
BIO 2600 Introduction to Cell Biology 3
BIO 2870 Anatomy and Physiology 5
BIO 3070 Genetics 5
BIO 3100 Cellular Biochemistry 3
BIO 3200 Human Physiology 3
BIO 4120 (WI) Comparative Physiology 4
BME 5010 Quantitative Physiology 4

Select one of the following:

- CHM 2220 Organic Chemistry II 5
  & CHM 2230 and Organic Chemistry II Laboratory

Total Credits 41
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>CHM 2280 &amp; CHM 2290</td>
<td>General Chemistry II: Analytical Chemistry and General Chemistry II: Analytical Chemistry Laboratory</td>
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<td>CHM 5400</td>
<td>Biological Physical Chemistry</td>
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<td>CHM 5420</td>
<td>Physical Chemistry I</td>
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<td>CHM 5600</td>
<td>Survey of Biochemistry</td>
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<td>CHM 6620</td>
<td>Metabolism: Pathways and Regulation</td>
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<td>CHM 6640</td>
<td>Molecular Biology</td>
<td>3</td>
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<td>CSC 1100 &amp; CSC 1101</td>
<td>Problem Solving and Programming and Problem Solving and Programming Laboratory</td>
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<td>CSC 2000</td>
<td>Introduction to C++ Programming Language</td>
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<td>CSC 2110 &amp; CSC 2111</td>
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<td>MAT 2030</td>
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<td>MAT 2150</td>
<td>Differential Equations and Matrix Algebra</td>
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<td>MAT 2210</td>
<td>Probability and Statistics</td>
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<td>MAT 2350</td>
<td>Elementary Differential Equations</td>
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<td>MAT 5100</td>
<td>Numerical Methods I</td>
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<tr>
<td>MAT 5700</td>
<td>Introduction to Probability Theory</td>
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<tr>
<td>NFS 2030</td>
<td>(LS) Nutrition and Health</td>
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<tr>
<td>PHY 3300 &amp; PHY 3310</td>
<td>Introductory Modern Physics and Introductory Modern Physics Laboratory</td>
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<td>PHY 5200</td>
<td>Classical Mechanics I</td>
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<td>PHY 6400</td>
<td>Quantum Physics I</td>
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<td>PHY 6500</td>
<td>Thermodynamics and Statistical Physics</td>
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<td>PHY 6600</td>
<td>Electromagnetic Fields I</td>
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<tr>
<td>ROC 5010</td>
<td>Introduction to Radiological Physics</td>
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Classes not on this list can be taken if prior approval from the undergraduate Physics student advisor has been obtained.