

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:

Code	Title	Credits
Select one of the following:		10
Option 1		
PHY 2130 & PHY 2131	Physics for the Life Sciences I and Physics for the Life Sciences Laboratory	
PHY 2140 & PHY 2141	Physics for the Life Sciences II and Physics for the Life Sciences Laboratory	
Option 2		
PHY 2170 & PHY 2171	University Physics I for Scientists and Engineers and University Physics I Experimental Laboratory	
PHY 2180 & PHY 2181	University Physics II for Scientists and Engineers and University Physics II Experimental Laboratory	
MAT 2010	Calculus I	4
MAT 2020	Calculus II	4

Program Requirements

Candidates must complete at least 120 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/>) and the College (<http://bulletins.wayne.edu/undergraduate/college-liberal-arts-sciences/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, as well as a grade point average of at least 2.5 in all major and cognate requirements.

Major Requirements

All B.S. candidates in Biomedical Physics must take:

Code	Title	Credits
PHY 1001	Perspectives in Physics, Biomedical Physics, and Astronomy	1
PHY 2130 or PHY 2170	Physics for the Life Sciences I University Physics I for Scientists and Engineers	4
PHY 2131 or PHY 2171	Physics for the Life Sciences Laboratory University Physics I Experimental Laboratory	1

PHY 2140 or PHY 2180	Physics for the Life Sciences II University Physics II for Scientists and Engineers	4
PHY 2141 or PHY 2181	Physics for the Life Sciences Laboratory University Physics II Experimental Laboratory	1
PHY 3300	Introductory Modern Physics	3
PHY 3750	Introduction to Computational Methods	1
PHY 4700	Introduction to Biomedical Physics	4
PHY 5750	Biological Physics	4
PHY 6290	Survey of Biophysics	3
PHY 6750	Applied Computational Methods	2
PHY 6780	Research Methods in Biomedical Physics	3
ROC 6710	Physics in Medicine	3
Total Credits		34

Cognate Requirements

B.S. candidates in Biomedical Physics must also take:

Code	Title	Credits
MAT 2010	Calculus I	4
MAT 2020	Calculus II	4
Two general chemistry courses with labs		10
BIO 1510 & BIO 1511	Basic Life Mechanisms and Basic Life Mechanisms Laboratory	4
Total Credits		22

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

Concentrations

All BMP majors are required to choose a concentration. The BMP program offers three concentrations: Biophysics, Medical Physics, and Premedical.

Biophysics Concentration

In addition to the requirements listed above, students taking the biophysics concentration will be required to take:

Code	Title	Credits
PHY 3500	Introduction to Thermal and Fluid Physics	3
PHY 5340 & PHY 5341	Optics and Optics Laboratory	5
PHY 5620 & PHY 5621	Electronics and Electrical Measurements and Electronics and Electrical Measurements Laboratory	5
Total Credits		13

Medical Physics Concentration

In addition to the requirements listed above, students taking the medical physics concentration will be required to take:

Code	Title	Credits
Select one of the following:		5
PHY 5340 & PHY 5341	Optics and Optics Laboratory	
PHY 5620 & PHY 5621	Electronics and Electrical Measurements and Electronics and Electrical Measurements Laboratory	
PHY 6600	Electromagnetic Fields I	4

MAT 2150	Differential Equations and Matrix Algebra	4
BIO 1500 & BIO 1501	Basic Life Diversity and Basic Life Diversity Laboratory	4
Total Credits		17

Students taking the medical physics concentration are *strongly encouraged* to take PHY 2170/PHY 2171 and PHY 2180/PHY 2181 instead of PHY 2130/PHY 2131 and PHY 2140/PHY 2141. For consideration by medical physics professional programs, students taking the Medical Physics concentration are also *strongly encouraged* to take BIO 2600.

Premedical Concentration

In addition to the requirements listed above, students taking the premedical concentration will be required to take:

Code	Title	Credits
CHM 1240 & CHM 1250	Organic Chemistry I and Organic Chemistry I Laboratory	5
BIO 1500 & BIO 1501	Basic Life Diversity and Basic Life Diversity Laboratory	4
Select one of the following:		5
PHY 5340 & PHY 5341	Optics and Optics Laboratory	
PHY 5620 & PHY 5621	Electronics and Electrical Measurements and Electronics and Electrical Measurements Laboratory	
Total Credits		14

Students taking the premed option are also *strongly encouraged* to take the following courses to satisfy the premedical requirements:

Code	Title	Credits
CHM 2220 & CHM 2230	Organic Chemistry II and Organic Chemistry II Laboratory	5
BIO 2600	Introduction to Cell Biology	4
BIO 3200	Human Physiology	3
Biochemistry:		3
BIO 3100 or CHM 5600	Cellular Biochemistry Survey of Biochemistry	

Physics and Biomedical Physics Honors Program

Undergraduate majors, in both Physics and Biomedical Physics, with a minimum grade point average of 3.3 can enroll in the Honors program of the Department of Physics and Astronomy. Prospective students should consult the departmental Undergraduate Academic Advisor as soon as they declare their major to learn about specific requirements.

Physics AGRADE Program

Seniors in Physics and Astronomy, with a minimum grade point average of 3.5, may enroll simultaneously in the undergraduate and graduate programs. These students can apply up to fifteen credits towards both the bachelors and masters degrees in physics. Contact Undergraduate Academic Advisor for further information.

Biomedical Physics-BME AGRADE Program

Outstanding seniors in Biomedical Physics, who have completed at least 90 credits and have an overall GPA of at least 3.5, and major biomedical physics classes GPA at least 3.6, can apply to enter the

cross-college AGRADE program between the Biomedical Physics undergraduate program (College of Liberals Arts and Sciences) and Biomedical Engineering (BME) Master's programs (James and Patricia Anderson College of Engineering). The AGRADE program allows students to apply up to 15 credits of selected graduate courses, taken as an undergraduate, towards a Master's degree in Biomedical Engineering. The Physics courses that can be counted towards MS-BME degree include PHY 5340/PHY 5341 or PHY 5620/PHY 5621, PHY 5750, and PHY 6780. This enables students to complete an undergraduate degree in Biomedical Physics and a graduate degree in Biomedical Engineering in just 5 years of full-time study. For more details, please contact the undergraduate Physics advisor in the Department of Physics and Astronomy, or the graduate advisor in the Department of Biomedical Engineering.