

BIOPHYSICS, BACHELOR OF ARTS

Biophysics Major Requirements

(See also Requirements for a Bachelor's Degree (<https://e-catalogue.jhu.edu/ksas-wse/undergraduate-policies/academic-policies/requirements-bachelors-degree/>)).

Code	Title	Credits
Chemistry		
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.030.102 & AS.030.106	Introductory Chemistry II and Introductory Chemistry Laboratory II	4
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
AS.030.205	Introductory Organic Chemistry I	4
AS.030.206	Organic Chemistry II	4
or AS.030.212	Honors Organic Chemistry II	
Physics		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.105	Classical Mechanics I	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
or AS.173.115	Classical Mechanics Laboratory	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.106	Electricity and Magnetism I	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	1
or AS.173.116	Electricity and Magnetism Laboratory	
Mathematics		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
or AS.110.113	Honors Single Variable Calculus	
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
One additional Math elective is required. See "Math List" below.		
Biophysics		
AS.250.205	Introduction to Computing	3
AS.250.315	Biochemistry I	3
AS.250.372	Biophysical Chemistry	4
AS.250.381	Spectroscopy and Its Application in Biophysical Reactions	3
AS.250.383	Molecular Biophysics Laboratory (Writing Intensive)	3
Research (6 credits required) ¹		
AS.250.520	Introduction to Biophysics Research ²	3
Major Electives		
Three Courses from List #1		9-12
Three Courses from List #2		9-12

One Course from the Advanced Seminar List	3
Total Credits	82-88

¹ All students will be expected to present their research in poster or oral format at the Biophysics Department Research Symposium in April.

In most cases, students will present in their senior year. Research for credit in Intersession will not count towards this requirement.

² This course is taken twice in 2 different semesters with both semesters being graded S/U for 3 credits. Students who take AS.250.520 during summer should register for 3 credits (typically completed over 10 weeks). In this case, an S/U grade will be given after completing all summer research.

Math List (Select one from this list as required Math Elective)

Code	Title	Credits
AS.110.201	Linear Algebra	4
AS.110.212	Honors Linear Algebra	4
EN.553.211	Probability and Statistics for the Life Sciences	4
or EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
or EN.553.311	Intermediate Probability and Statistics	
EN.553.291	Linear Algebra and Differential Equations	4

Any 300 level course or higher with approval of faculty advisor

List #1 (Select 3 from this list as Major Electives)

Code	Title	Credits
AS.250.253	Protein Engineering and Biochemistry Lab	3-4
or AS.250.254	Protein Biochemistry and Engineering Laboratory	
AS.250.316	Biochemistry II	3
AS.171.201	Special Relativity/Waves	4
AS.171.202	Modern Physics	4
or AS.171.310	Biological Physics	
EN.601.226	Data Structures ¹	4
EN.601.220	Intermediate Programming	4

¹ Upper level computer science or bio-computing course can replace these courses with approval from advisor

List #2 (Select 3 from this list as Major Electives)

Code	Title	Credits
AS.250.253	Protein Engineering and Biochemistry Lab	3-4
or AS.250.254	Protein Biochemistry and Engineering Laboratory	
AS.250.302	Modeling the Living Cell	4
AS.250.316	Biochemistry II	3
AS.171.201	Special Relativity/Waves	4
AS.171.202	Modern Physics	4
or AS.171.310	Biological Physics	

Any course 300-level or higher in Biology, Chemistry, Math, Physics, or Computer Science that is 3 credits or more.	3
Any course on the Advanced Seminar List ¹	3

¹ Advanced Seminar course used to complete the List 2 requirement may not double count with the Advanced Seminar course requirement.

Advanced Seminar List (Select one from this list as Advanced Seminar Requirement)

Code	Title	Credits
AS.250.335	Single Molecule & Cell Biophysics	3
AS.250.403	Advanced Seminar in Bioenergetics	3
AS.250.411	Advanced Seminar in Structural Biology of Chromatin	3
AS.250.421	Advanced Seminar in Membrane Protein Structure, Function & Pharmacology	3
AS.250.410	Genome Maintenance and Genome Engineering	3
AS.250.420	Advanced Seminar in Macromolecular Binding	3

Students must complete a course from the Advanced Seminar List and three courses from List 2. Scheduling conflicts occasionally arise due to schedule changes in the departments of Physics, Biology, and Chemistry. Prospective biophysics majors should consult with the departmental undergraduate advisor to determine how the conflicts can be resolved.

Sample Program of Study

First Year

First Semester	Credits	Second Semester	Credits
AS.030.101	3	AS.030.102	3
AS.030.105	1	AS.030.106	1
AS.110.108	4	AS.110.109	4
AS.250.205	3		
	11		8

Second Year

First Semester	Credits	Second Semester	Credits
AS.030.205	4	AS.030.206	4
AS.110.202	4	AS.171.104	4
AS.171.103	4	AS.173.112	1
AS.173.111	1	Required Math Elective	4
	13		13

Third Year

First Semester	Credits	Second Semester	Credits
AS.250.253	3	AS.250.381	3
AS.250.315	3	Elective from List #1	3-4
AS.250.372	4	Elective from List #2	3-4
AS.250.520	3	AS.250.520	3
	13		12-14

Fourth Year

First Semester	Credits	Second Semester	Credits
AS.250.521 (optional)	3	AS.250.383	3
Elective from List #1	3-4	Elective from List #1	3-4
Elective from List #2	3-4	Elective from List #2	3-4

Required Advanced Seminar Course	3	
		12-14
		9-11

Total Credits 91-97

A Note on Writing Courses

The Krieger School of Arts & Sciences requires 12 credits of writing-intensive coursework. Although many humanities and social science courses have a writing designation, a few courses within the major also fulfill the requirement. Current examples include:

Code	Title	Credits
AS.250.335	Single Molecule & Cell Biophysics	3.0
AS.250.383	Molecular Biophysics Laboratory	3.0
AS.250.403	Advanced Seminar in Bioenergetics	3.0
AS.250.411	Advanced Seminar in Structural Biology of Chromatin	3.0
AS.250.421	Advanced Seminar in Membrane Protein Structure, Function & Pharmacology	3.0

Fulfilling some of the writing requirement with one or more biophysics courses requires advanced planning because not all of these courses are offered every year.

Honors in Biophysics

The Jenkins Biophysics department offers outstanding students the opportunity to earn departmental honors in Biophysics. This honors distinction appears on the student's transcript upon graduation. If the honors requirements are approved prior to early April, an "Honors" distinction will additionally appear in the commencement program.

The requirements for departmental honors in biophysics are two-fold:

- The student must maintain an overall GPA of 3.5 or greater
- The student must write and receive approval of an Honors paper that is based on their 6 credits of required research.

Generally, the Honors paper must be submitted no later than March 1 of the senior year to meet the commencement deadline. Details on the format of the Honors paper can be found on the departmental website (students do not register for credit for the paper). Schedule a meeting with your Biophysics faculty advisor if you are interested in seeking departmental honors.

Ete Z. Szüts Undergraduate Research Travel Award

This award, named in honor of a Ph.D. graduate student from this department, will provide funds for up to 80 percent of the transportation costs of undergraduate research students in biophysics to attend a scholarly meeting. Recipients must be sponsored by a member of the departmental faculty who will be at the same meeting. Schedule a meeting with your Biophysics faculty advisor if you are interested in the Szüts Travel Award.

H. Keffer Hartline Award for Excellence in Undergraduate Research in Biophysics

This award honors a senior Biophysics Major for excellence in undergraduate research in Biophysics. Recipients are selected by Biophysics Faculty.

Detlev W. Bronk Award for Outstanding Scholarship in Biophysics

This award honors a senior Biophysics major for outstanding academic achievement in Biophysics. Recipients are selected by Biophysics Faculty.