

# PHYSICS (BS)

## Program Description

When you major in Physics, you study the changes, interactions, and properties of matter and energy. As a result, you learn how physics strongly influences humankind's understanding of nature and how engineers create new technology based on the principles first discovered by physicists, contributing to the social economics and changes.

The bachelor of science in Physics provides you with the preparation you need for graduate studies or professional careers in physics.

## Entering and Completing the Major

In order to earn a degree, you must complete at least one academic major. SPU encourages students to explore various academic paths, so if you change your mind about a major, or want to include an additional program, you are able to do so, as outlined below.

Note that the University encourages you to enter your chosen major(s) as soon as you have determined it and are eligible to join it, especially by the start of your junior year. Students who transfer as juniors and seniors should enter a major within their first two quarters at SPU.

- If this is your first quarter at SPU and you identified a major in this department as your first choice on your application for admission to the University, you have gained entry to the major. To change or add a major, follow these instructions (<https://spu.atlassian.net/l/cp/a3th1keb/>).
- If you are an SPU student with an SPU cumulative GPA of 2.0 or better, follow these instructions (<https://spu.atlassian.net/l/cp/a3th1keb/>) to enter a major in this department.
- The University requires a grade of C- or better in all classes that apply to a major; however, programs may require higher minimum grades in specific courses. You may repeat an SPU course only once for a higher grade.
- To advance in this program, meet with your faculty advisor regularly to discuss your grades, course progression, and other indicators of satisfactory academic progress. If your grades or other factors indicate that you may not be able to successfully complete the major or minor, your faculty advisor can work with you to explore options, which may include choosing a different major.
- You must complete the major requirements that are in effect in the SPU Undergraduate Catalog for the year you enter the major.

## Physics (BS)

87 Credits Minimum, Including 34 Upper Division (UD)

Code	Title	Credits
<b>Introductory Classes</b>		
Select one of the following Groups:		15
Group A:		
PHY 1101	General Physics	
PHY 1102	General Physics	
PHY 1103	General Physics	
Group B:		
PHY 1121	Physics for Science and Engineering	
PHY 1122	Physics for Science and Engineering	
PHY 1123	Physics for Science and Engineering	

PHY 2321	Intermediate Physics	5
Section Credits Required		20
<b>Math</b>		
MAT 1234	Calculus I	5
MAT 1235	Calculus II	5
MAT 1236	Calculus III	5
MAT 2401	Linear Algebra	3
MAT 3237	Differential Equations	3
MAT 3238	Vector Calculus	3
Select three credits of the following:		3
CSC 2230	Computer Programming for Engineers	
DAT 3380	Introduction to Data Science	
MAT 4725	Numerical Analysis	
MAT 4830	Mathematical Modeling	
Section Credits Required		27
<b>Required Upper Division*</b>		
PHY 3110	Mechanical Modeling and Analysis	3
PHY 3315	Electricity and Magnetism I	3
PHY 3401	Thermal and Statistical Physics	3
PHY 3341	Quantum Mechanics	5
PHY 4315	Electricity and Magnetism II	3
PHY 4898	Physics Capstone	1
PHY 4970	Undergraduate Research	2
Section Credits Required		20
<b>Required Lab Classes</b>		
PHY 3311	Experimental Methods I	3
PHY 3312	Experimental Methods II	3
Section Credits Required		6
<b>Electives</b>		
Select 14 credits of the following, including UD to reach 34 and 87 total:		14
EGR 3611	Appropriate and Sustainable Engineering I: Alternative Energy Systems	
PHY 1135	Astronomy: Individual and the Universe	
PHY 1140	The Physics of Sound	
PHY 1142	Earth System Science	
PHY 1910	Special Topics in Physics Seminar	
PHY 3011	Global Climate Change: Scientific, Social and Moral Implications	
PHY 3211	Acoustics	
PHY 4101	Astrophysics of Stars	
PHY 4311	Optics and Lasers	
PHY 4520	Preparing to Teach	
PHY 4900	Independent Study	
PHY 4940	Internship in Physics	
PHY 4950	Special Topics in Physics	
Section Credits Required		14
<b>Total Credits</b>		<b>87</b>

## Suggested Course Sequence

Course	Title	Credits
<b>First Year</b>		
<b>Autumn</b>		
PHY 1121	Physics for Science and Engineering	5
MAT 1234	Calculus I	5
UCOL 1000	University Colloquium	1
<b>Credits</b>		<b>11</b>
<b>Winter</b>		
PHY 1122	Physics for Science and Engineering	5
MAT 1235	Calculus II	5
<b>Credits</b>		<b>10</b>
<b>Spring</b>		
PHY 1123	Physics for Science and Engineering	5
MAT 1236	Calculus III	5
<b>Credits</b>		<b>10</b>
<b>Any Quarter</b>		
WRI 1000	Academic Inquiry and Writing Seminar	5
WRI 1100	Disciplinary Research and Writing Seminar	5
UFDN 1000	The Christian Faith	5
<b>Credits</b>		<b>15</b>
<b>Second Year</b>		
<b>Autumn</b>		
PHY 2321	Intermediate Physics	5
PHY 3311	Experimental Methods I	3
MAT 3238	Vector Calculus	3
PHY 4520	Preparing to Teach (example of an elective course)	2
<b>Credits</b>		<b>13</b>
<b>Winter</b>		
PHY 3312	Experimental Methods II	3
MAT 3237	Differential Equations	3
PHY 4520	Preparing to Teach (example of an elective course)	2
<b>Credits</b>		<b>8</b>
<b>Spring</b>		
PHY 3313	Experimental Methods III	3
MAT 2401	Linear Algebra	3
PHY 4520	Preparing to Teach (example of an elective course)	2
<b>Credits</b>		<b>8</b>
<b>Any Quarter</b>		
UFDN 2000	Christian Scripture	5
UCOR 2000	The Emergence of the Modern Global System	5
Ways of Engaging ( <a href="https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wetext">https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wetext</a> ), Ways of Knowing in the Arts ( <a href="https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wkatext">https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wkatext</a> ) (Sophomore through Senior Year)		5
Cultural Understanding and Engagement ( <a href="https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/cue-requirement/">https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/cue-requirement/</a> ), Ways of Knowing in the Humanities ( <a href="https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wkhtext">https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wkhtext</a> ) (Sophomore through Senior Year)		5
Ways of Knowing in the Social Sciences ( <a href="https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wksstext">https://catalog.spu.edu/undergraduate/degree-requirements/baccalaureate-degree-requirements/exploratory-curriculum/#wksstext</a> ) (Sophomore through Senior Year)		5
<b>Credits</b>		<b>25</b>
<b>Third Year</b>		
<b>Autumn</b>		
PHY 3315	Electricity and Magnetism I	3
EGR 3611	Appropriate and Sustainable Engineering I: Alternative Energy Systems (example of an elective course)	5
<b>Credits</b>		<b>8</b>

<b>Winter</b>		
PHY 4311	Optics and Lasers (example of an elective course, taught every other year) <sup>1</sup>	5
Math Elective		3
<b>Credits</b>		<b>8</b>
<b>Spring</b>		
ME 3400	Dynamics	5
PHY 3011	Global Climate Change: Scientific, Social and Moral Implications (example of an elective course) <sup>3</sup>	5
<b>Credits</b>		<b>10</b>
<b>Any Quarter</b>		
UFDN 3100	Christian Theology	5
UCOR 3000	Faith, Philosophy, and Science	5
<b>Credits</b>		<b>10</b>
<b>Fourth Year</b>		
<b>Autumn</b>		
PHY 4898	Physics Capstone	1
ME 3500	Thermal Science I: Thermodynamics	5
<b>Credits</b>		<b>6</b>
<b>Winter</b>		
PHY 4898	Physics Capstone	1
PHY 3401	Thermal and Statistical Physics (taught every other year)	3
<b>Credits</b>		<b>4</b>
<b>Spring</b>		
PHY 4315	Electricity and Magnetism II (taught every other year)	3
PHY 3110	Mechanical Modeling and Analysis (taught every other year)	3
PHY 4970	Undergraduate Research	2
<b>Credits</b>		<b>8</b>
<b>Total Credits</b>		<b>154</b>

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Optics is an elective course but is strongly recommended

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PHY 3011 Global Climate Change: Scientific, Social and Moral Implications Global Climate Change can count as a WE course or an UD elective but not as both unless a student is a double major and PHY 3011 Global Climate Change: Scientific, Social and Moral Implications is not required for the other major.