Bachelor of Science

Physics (BS)

The Physics major is designed primarily for students preparing to do graduate study in physics and related fields or for students preparing to work professionally upon completion of the BS degree in various technical fields requiring the strongest preparation in physics.

Requirements

Lower-Division General Education

Written Communication (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#written)	6
Oral Communication (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#oral)	3
Mathematics (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#math)	3
Language and Culture (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#language)	0-6
Information Literacy and Research (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#information)	3
Human Behavior (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#behavior)	3
Human Creativity (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#creativity)	3
Interpreting the Past (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#interpret)	3
Literature (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#literature)	3
Philosophy and Ethics (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#philosophy)	3
The Nature of Science (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#nature)	8
Impact of Technology (http://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#impact)	3

Mathematics: satisfied by the major

Information Literacy and Research: CS 120G or CS 121G or OEAS 130G

Nature of Science: satisfied by the major

Upper-Division General Education

- Option A. Approved Disciplinary Minor (a minimum of 12 hours determined by the department), or second degree or second major.
- Option B: Interdisciplinary Minor (specifically 12 hours, 3 of which may be in the major)
- Option C. An approved Certification Program such as teaching licensure
- Option D. Two Upper-Division Courses from outside the College of Sciences and not required by the major (6 hours)

Requirements for Graduation

All majors for the BS degree in physics require completion of a minimum of 120 credit hours (150 credit hours for the dual degree in physics and electrical engineering and the dual degree in physics and the Master of Business Administration), which must include both a minimum of 30 credit hours overall and 12 credit hours in upper-level courses in the major program from Old Dominion University, completion of ENGL 110C, ENGL 211C or ENGL 231C, and the writing intensive (W) course in the major with a grade of C or better, and Senior Assessment. Additionally, physics majors require completion of the Physics Exit Exam with a minimum score of 20th percentile, and the astrophysics major requires completion of the Astrophysics Exit Exam with a minimum score of 20th percentile. Additional hours may be required to meet the foreign language requirement. All majors require a minimum grade of C in PHYS 261N-PHYS 262N, PHYS 231N-PHYS 232N, or PHYS 226N-PHYS 227N. Except for the secondary physics education major, physics majors require a minimum cumulative grade point average of 2.00 overall and in the major. The secondary physics education major requires a minimum 2.75 grade point average overall, in the major, and in the professional education core, with no grade less than a C- in the major and professional education core. The professional education core satisfies the upper-level general education requirement.

Math Minor

Physics majors wishing to complete a minor in applied mathematics can do so with just two additional math courses. Please consult the Department of Mathematics section of the Catalog for details.

Physics Major

General Education		
Complete lower-division requirements		30-36
Complete upper-division requirements (minimum of 6 credit hours)		6
Physics Major		
MATH 211	Calculus I	4
MATH 212	Calculus II	4
MATH 312	Calculus III	4
or MATH 285	Transfer Credit for Calculus III	
MATH 307	Ordinary Differential Equations	3
or MATH 280	Transfer Credit for Ordinary Differential Equations	
Select one of the following:		3
MATH 316	Introductory Linear Algebra	
MATH 401	Partial Differential Equations	
MATH 421	Applied Mathematics II: Mathematical Modeling	
MATH 422	Applied Complex Variables	
CHEM 121N & CHEM 122N	Foundations of Chemistry I Lecture and Foundations of Chemistry I Laboratory	4
CHEM 123N & CHEM 124N	Foundations of Chemistry II Lecture and Foundations of Chemistry II Laboratory	4
PHYS 261N	Advanced University Physics I	4
or PHYS 231N	University Physics I	
or PHYS 226N	Honors: University Physics I	
CS 151	Introduction to Programming with Java	4
or CS 153	Introduction to Programming with Python	
PHYS 262N	Advanced University Physics II	4
or PHYS 232N	University Physics II	
or PHYS 227N	Honors: University Physics II	
PHYS 303	Intermediate Experimental Physics	3
PHYS 319	Analytical Mechanics	3
PHYS 323	Modern Physics	3
PHYS 355	Mathematical Methods of Physics	3
PHYS 413	Methods of Experimental Physics	3
PHYS 420	Introductory Computational Physics	3
PHYS 425	Electromagnetism I	3
PHYS 452	Introduction to Quantum Mechanics	3
PHYS 453	Electromagnetism II	3
PHYS 454	Thermal and Statistical Physics	3
PHYS 456	Intermediate Quantum Mechanics	3
PHYS 499W	Senior Thesis *	3
or PHYS 489W & PHYS 490W	Senior Thesis I and Senior Thesis II	
PHYS 120	Physics in the 21st Century **	1-2
or PHYS 309	Physics on the Back of an Envelope	
or ECE 111	Information Literacy and Research for Electrical and Computer Engineering	
Select two of the following: ***		6

ASTP 313	Elements of Astrophysics	
PHYS 411	Introduction to Atomic Physics	
ASTP 414	Relativity and Cosmology	
PHYS 415	Introduction to Nuclear and Particle Physics	
PHYS 416	Introduction to Solid State Physics	
PHYS 417	Introduction to Particle Accelerator Physics	
Total Credit Hours		**117-124**

* Grade of C or better required in PHYS 499W or both PHYS 489W and PHYS 490W

** ECE 111 is for students considering Physics Track D.

*** With at least three credits at the 400-level.

Elective Credit

Elective credit may be needed to meet the minimum requirement of 120 credit hours.

BS Degree with Honors

Qualified students may receive the BS degree with honors (to be noted on their diplomas) by completing specified additional requirements. At the time of application for this designation, a student must have a GPA of 3.50 or higher in physics, a GPA of 3.25 or higher overall, must have completed two contract honors courses, and must have completed 60 credit hours (of which at least 54 must be in grade-point graded courses) at Old Dominion University. (Contract honors courses are specialized courses of individual study under the direct supervision of a professor. Permission to take these courses is granted jointly by the Department of Physics and the Honors College.)

Degree Program Guide

The Degree Program Guide is a suggested curriculum to complete this degree program in four years. It is just one of several plans that will work and is presented only as broad guidance to students. Each student is strongly encouraged to develop a customized plan in consultation with their academic advisor. Additional information can also be found in Degree Works.

Course	Title	Credit Hours
Freshman		
Fall		
ENGL 110C	English Composition (Grade of C or better required)	3
MATH 211	Calculus I	4
CHEM 121N and CHEM 122N		4
Oral Communication		3
Language & Culture I (May be waived; See requirement details)		0-3
	Credit Hours	**14-17**
Spring		
MATH 212	Calculus II	4
Select one of the following:		4
PHYS 261N	Advanced University Physics I	
PHYS 231N	University Physics I	
PHYS 226N	Honors: University Physics I	
CHEM 123N and CHEM 124N		4
Philosophy and Ethics		3
Language & Culture II (May be waived; See requirement details)		0-3
	Credit Hours	**15-18**
Sophomore		
Fall		
MATH 312 or MATH 285		4
Select one of the following:		4
PHYS 262N	Advanced University Physics II	
PHYS 232N	University Physics II	
PHYS 227N	Honors: University Physics II	
ENGL 211C or ENGL 231C (Grade of C or better required)		3
Impact of Technology		3
Select one of the following:		3
CS 120G	Introduction to Information Literacy and Research	
CS 121G	Introduction to Information Literacy and Research for Scientists	
OEAS 130G	Research Skills and Information Literacy for the Natural Sciences	
	Credit Hours	**17**
Spring		
PHYS 319	Analytical Mechanics	3
CS 151 or CS 153	Introduction to Programming with Java or Introduction to Programming with Python	4
MATH 307 or MATH 280		3
Select one of the following:		1-2
PHYS 120	Physics in the 21st Century *	
PHYS 309	Physics on the Back of an Envelope *	
ECE 111	Information Literacy and Research for Electrical and Computer Engineering	
Human Creativity		3
	Credit Hours	**14-15**
Junior		
Fall		
PHYS 355	Mathematical Methods of Physics	3
PHYS 303	Intermediate Experimental Physics	3
PHYS 323	Modern Physics	3
PHYS 425	Electromagnetism I	3
Literature		3
	Credit Hours	**15**
Spring		
PHYS 413	Methods of Experimental Physics	3
PHYS 453	Electromagnetism II *	3
Select one of the following:		3
ASTP 313	Elements of Astrophysics *	
PHYS 411	Introduction to Atomic Physics	
PHYS 415	Introduction to Nuclear and Particle Physics	
PHYS 416	Introduction to Solid State Physics	

PHYS 417	Introduction to Particle Accelerator Physics	
Select one of the following:		3
MATH 316	Introductory Linear Algebra	
MATH 401	Partial Differential Equations	
MATH 421	Applied Mathematics II: Mathematical Modeling	
MATH 422	Applied Complex Variables	
Human Behavior		3
	Credit Hours	**15**
Senior		
Fall		
PHYS 420	Introductory Computational Physics	3
PHYS 452	Introduction to Quantum Mechanics	3
PHYS 489W or PHYS 499W		1-3
Interpreting the Past		3
Upper-Division General Education Course (Option D)		3
Elective (if needed)		3
	Credit Hours	**16-18**
Spring		
PHYS 456	Intermediate Quantum Mechanics *	3
PHYS 454	Thermal and Statistical Physics	3
Select one of the following:		3
ASTP 414	Relativity and Cosmology	
PHYS 411	Introduction to Atomic Physics	
PHYS 415	Introduction to Nuclear and Particle Physics	
PHYS 416	Introduction to Solid State Physics	
PHYS 417	Introduction to Particle Accelerator Physics	
PHYS 490W or PHYS 499W		2-3
Upper-Division General Education Course (Option D)		3
	Credit Hours	**14-15**
	Total Credit Hours	**120-130**

*PHYS 120 and PHYS 420 are offered fall semester only. ASTP 313, PHYS 309, PHYS 453, and PHYS 456 are offered spring semester only.

BA or BS to MBA (Master of Business Administration) Linked Program

The linked BA/MBA or BS/MBA program is an early entry to the MBA program of study. The early-entry program is designed for well qualified non-business undergraduate ODU students to start their MBA program prior to completing their undergraduate degree. Well qualified non-business undergraduate students may take MBA-level courses as early as three semesters prior to graduation and count up to 12 graduate credits toward their undergraduate degree. Students participating in the early-entry program must earn a minimum of 150 credit hours (120 discrete credit hours for the undergraduate degree and 30 discrete credit hours for the graduate degree). Early-entry program students should carefully consider their undergraduate degree program requirements when planning their course of study. Students in the early-entry program work in close consultation with the MBA Program Office and should refer to information in the Strome College of Business section in the graduate catalog (http://catalog.odu.edu/graduate/stromecollegeofbusiness/) to develop an individualized plan of study based on the required coursework.

BA or BS to MPA (Master of Public Administration) Linked Program

The linked BA/MPA or BS/MPA program provides qualified Old Dominion University undergraduate students with the opportunity to earn a master's degree in public administration while taking credits in the MPA program as an undergraduate student. The program is designed for highly motivated students with the desire to immediately continue their education after the bachelor's degree. The program is especially relevant to individuals seeking to work (or currently working) in the public or non-profit sectors, but is suitable for students from any undergraduate major. Graduate courses may be taken during the fall and spring semester of the student's senior undergraduate year. Up to 12 graduate credits can count toward both the undergraduate and graduate degree and can meet upper-level General Education requirements. After receiving the undergraduate degree, a student will continue with the MPA program, taking MPA courses until completing the required 39 credit hours. Students in the linked program must earn a minimum of 150 credit hours (120 discrete credit hours for the undergraduate degree and 30 discrete credit hours for the graduate degree).

Requirements for admission to the graduate program can be found in the School of Public Service section of the Graduate Catalog (http://catalog.odu.edu/graduate/business/public-service/). For additional information, please contact the School of Public Service in the Strome College of Business.