

# Physics and Master of Business Administration (BS, MBA)

The Bachelor of Science in physics and Master of Business Administration dual degree program is a five-year program. After students have satisfactorily completed their undergraduate requirements, they complete the remaining requirements in the MBA program. Students must earn a minimum of 150 credits (120 discrete credits for the undergraduate degree and 30 discrete credits for the graduate degree).

## Requirements

### Lower-Division General Education

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

Mathematics: satisfied by the major

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

Nature of Science: satisfied by the major

### Upper-Division General Education

The upper-division general education requirement is met by the MBA coursework.

### 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 20<sup>th</sup> percentile, and the astrophysics major requires completion of the Astrophysics Exit Exam with a minimum score of 20<sup>th</sup> 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.

## Physics and MBA Dual Degree

Students in this major 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).

### General Education

Complete lower-division requirements 30-36

Complete upper-division requirements (satisfied by MBA coursework)

### Physics and MBA Dual Degree

#### Physics Course Requirements

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
CS 151	Introduction to Programming with Java	4
or CS 153	Introduction to Programming with Python	
PHYS 261N	Advanced University Physics I	4
or PHYS 231N	University Physics I	
or PHYS 226N	Honors: University Physics I	
PHYS 262N	Advanced University Physics II	4
or PHYS 232N	University Physics II	
or PHYS 227N	Honors: University Physics II	
PHYS 323	Modern Physics	3
PHYS 319	Analytical Mechanics	3
PHYS 303	Intermediate Experimental Physics	3
PHYS 355	Mathematical Methods of Physics	3
PHYS 413	Methods of Experimental Physics	3
PHYS 425	Electromagnetism I	3
PHYS 452	Introduction to Quantum Mechanics	3
PHYS 454	Thermal and Statistical Physics	3
Select one of the following:		3
PHYS 420	Introductory Computational Physics	
PHYS 453	Electromagnetism II	
PHYS 456	Intermediate Quantum Mechanics	
PHYS 499W	Senior Thesis *	3
or PHYS 489W & PHYS 490W	Senior Thesis I and Senior Thesis II	
Approved Physics Seminar		1
Select one of the following:		3
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

### MBA Coursework

Complete MBA coursework	45
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**Total Credit Hours** **147-153**

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

### MBA Coursework

MBA courses may be taken beginning with the second semester of the junior year. Students must maintain a 3.0 grade point average in these courses to continue in the program. Additional information can be found in the section on BS/MBA Linked Program at the beginning of the College of Sciences section of this Catalog and the Strome College of Business section in the Graduate Catalog (<http://catalog.odu.edu/graduate/stromecollegeofbusiness/>).

## Degree Program Guide

Course	Title	Credit Hours
<b>Freshman</b>		
<b>Fall</b>		
ENGL 110C	English Composition (Grade of C or better required)	3
MATH 211	Calculus I	4
Human Creativity		3
Oral Communication		3
Elective or Language & Culture I (May be waived; See requirement details)		3
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
ENGL 211C or ENGL 231C (Grade of C or better required)		3
MATH 212	Calculus II	4
CS 151 or CS 153	Introduction to Programming with Java or Introduction to Programming with Python	4
Human Behavior		3
Elective or Language & Culture II (May be waived; See requirement details)		0-3
<b>Credit Hours</b>		<b>14-17</b>
<b>Sophomore</b>		
<b>Fall</b>		
CHEM 121N and CHEM 122N*		4
PHYS 261N or PHYS 231N or PHYS 226N	Advanced University Physics I or University Physics I or Honors: University Physics I	4
Information Literacy and Research: CS 120G or CS 121G or OEAS 130G		3
Literature		3
<b>Credit Hours</b>		<b>14</b>
<b>Spring</b>		
CHEM 123N and CHEM 124N*		4
MATH 312 or MATH 285		4

PHYS 262N or PHYS 232N or PHYS 227N	Advanced University Physics II or University Physics II or Honors: University Physics II	4
Impact of Technology		3
<b>Credit Hours</b>		<b>15</b>
<b>Junior</b>		
<b>Fall</b>		
MATH 307 or MATH 280		3
PHYS 323	Modern Physics	3
PHYS 303	Intermediate Experimental Physics	3
PHYS 355	Mathematical Methods of Physics	3
PHYS 425	Electromagnetism I	3
<b>Credit Hours</b>		<b>15</b>
<b>Spring</b>		
PHYS 319	Analytical Mechanics	3
PHYS 413	Methods of Experimental Physics	3
MATH 316 or MATH 401 or MATH 421 or MATH 422		3
MBA 600	Introduction to Statistics	1
Interpreting the Past		3
Philosophy and Ethics		3
<b>Credit Hours</b>		<b>16</b>
<b>Senior</b>		
<b>Fall</b>		
PHYS 452	Introduction to Quantum Mechanics	3
ASTP 414 or PHYS 411 or PHYS 420 *		3
PHYS 499W or PHYS 489W and PHYS 490W (C or better required)*		3
MBA 600	Introduction to Statistics	1
MBA 606	Mathematical Foundations for Business	1
MBA course		5
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
ASTP 313 or PHYS 415 or PHYS 416 or PHYS 417 *		3
PHYS 454	Thermal and Statistical Physics	3
Approved Physics Seminar*		1
MBA 621	Effective Business Writing	1
MBA 638	Spreadsheet Modeling	1
MBA courses		7
<b>Credit Hours</b>		<b>16</b>
<b>Fifth Year</b>		
<b>Fall</b>		
MBA courses		14
<b>Credit Hours</b>		<b>14</b>
<b>Spring</b>		
MBA courses		14
<b>Credit Hours</b>		<b>14</b>
<b>Total Credit Hours</b>		<b>150-153</b>

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