

# Physics (BA/BS)

Explore the laws of nature and the relationship between energy and matter with the Department of Physics. You will have the opportunity to research with award-winning faculty, participate in practical applications such as labs and demonstrations, and develop career skills through internships. We encourage physics majors to study across disciplines, pairing their work with chemistry, biology, or anything else of interest—at the University of Oregon, you have the freedom to choose your own path.

A degree in physics will give you a solid foundation to pursue careers and graduate studies in astrophysics, engineering, teaching, astronomy, medicine, technology, communication, and a host of other disciplines.

## Program Learning Outcomes

Upon successful completion of this program, students will be able to:

- Have knowledge of principles and concepts for specific core subject areas listed above.
- Apply principles and concepts to analyze problems within specific core areas.
- Have capability with quantitative methods appropriate for the core areas.
- Analyze and interpret quantitative results.
- Have experience with integration of concepts: analysis of complex problems cutting across multiple core areas.
- Collect and appropriately analyze data working independently and in collaboration with others (experimentation; data collection, reduction and analysis; model-based computation including simulations and inversion of observations; and literature research using basic and state-of-the-art technology).
- Communicate orally and in writing by making appropriate use of current presentation technology.
- Have familiarity with current developments in physics.

## Physics Major Requirements

Code	Title	Credits
<b>Physics Core Courses</b>		
MATH 251–253	Calculus I-III	12
	or MATH 261–263	Calculus with Theory I-III
MATH 256	Introduction to Differential Equations	4
MATH 281–282	Several-Variable Calculus I-II	8
PHYS 251–253	Foundations of Physics I	12
PHYS 290	Foundations of Physics Laboratory <sup>1</sup>	2
PHYS 351–353	Foundations of Physics II	12
PHYS 391	Physics Experimentation Data Analysis Laboratory	4
<b>Interdisciplinary Science Core</b>		
Two from the following: <sup>2</sup>		8
CH 221	General Chemistry I	
CH 222	General Chemistry II	
CH 224H	Advanced General Chemistry I	
CH 225H	Advanced General Chemistry II	
BI 211	General Biology I: Cells	

BI 212	General Biology II: Organisms	
BI 213	General Biology III: Ecology and Evolution	
CS 210	Computer Science I	
CS 211	Computer Science II	
CS 212	Computer Science III	
ERTH 201	Dynamic Planet Earth	
HPHY 212	Scientific Investigation in Physiology	
<b>Physics Upper-Division Courses</b>		<b>24</b>
Three upper-division laboratory courses <sup>3</sup>		6
<b>Total Credits</b>		<b>92</b>

<sup>1</sup> To be repeated, totaling 2 credits.

<sup>2</sup> Students are strongly urged to complete this requirement in the first two years.

<sup>3</sup> Any combination of PHYS 424-425 or PHYS 431-432 or PHYS 491-493 or PHYS 401, to total 6 credits.

## Honors

To be recommended by the faculty for graduation with honors in physics, a student must complete at least 46 credits in upper-division physics courses, of which at least 40 credits must be taken for letter grades, and earn at least a 3.50 grade point average in these courses.

As an alternative, undergraduate research leading to the defense of a thesis accompanied by at least a 3.30 grade point average can lead to recommendation for graduation with honors. Contact the director of undergraduate studies for more information.

## Four-Year Degree Plan

### Bachelor of Arts in Physics

Course	Title	Credits	Milestones
<b>First Year</b>			
<b>Fall</b>			
PHYS 251	Foundations of Physics I	4	
	or General Physics		
	PHYS 201		
PHYS 290	Foundations of Physics Laboratory	1	
CH 221	General Chemistry I	4	
MATH 251	Calculus I	4	
	or Precalculus I: Functions		
	MATH 111Z or Precalculus II: Trigonometry		
	or MATH 112Z		
WR 121Z	Composition I	4	
		<b>Credits</b>	<b>17</b>
<b>Winter</b>			
PHYS 252	Foundations of Physics I	4	
	or Calculus I		
	MATH 251 or Precalculus II: Trigonometry		
	or MATH 112Z		
PHYS 290	Foundations of Physics Laboratory	1	
CH 222	General Chemistry II	4	
MATH 252	Calculus II	4	

WR 122Z	Composition II	4
<b>Credits</b>		<b>17</b>
<b>Spring</b>		
PHYS 253	Foundations of Physics I or MATH 251	4
PHYS 290	Foundations of Physics Laboratory	1
MATH 253	Calculus III or MATH 251	4
CS 210	Computer Science I	4
Core-education course in arts and letters		4
<b>Credits</b>		<b>17</b>
<b>Total Credits</b>		<b>51</b>

Course	Title	Credits	Milestones
<b>Second Year</b>			
<b>Fall</b>			
PHYS 351	Foundations of Physics II	4	
MATH 281	Several-Variable Calculus I or MATH 253	4	
PHYS 391	Physics Experimentation Data Analysis Laboratory	4	
Core-education course in arts and letters		4	
<b>Credits</b>		<b>16</b>	
<b>Winter</b>			
PHYS 353	Foundations of Physics II	4	
MATH 282	Several-Variable Calculus II or MATH 281	4	
Core-education course in social science		4	
Core-education course that also satisfies a cultural literacy requirement		4	
<b>Credits</b>		<b>16</b>	
<b>Spring</b>			
PHYS 353	Foundations of Physics II	4	
MATH 256	Introduction to Differential Equations or MATH 282	4	
Core-education course in arts and letters		4	
Core-education course in social science		4	
<b>Credits</b>		<b>16</b>	
<b>Total Credits</b>		<b>48</b>	

Course	Title	Credits	Milestones
<b>Third Year</b>			
<b>Fall</b>			
PHYS 412	Mechanics, Electricity, and Magnetism	4	
Core-education course in arts and letters		4	
Core-education course that also satisfies a cultural literacy requirement		4	
First term of first-year second-language sequence		4	
<b>Credits</b>		<b>16</b>	

<b>Winter</b>		
PHYS 411	Mechanics, Electricity, and Magnetism	4
PHYS 413	Mechanics, Electricity, and Magnetism	4
Core-education course in social science		4
Second term of first-year second-language sequence		4
<b>Credits</b>		<b>16</b>
<b>Spring</b>		
PHYS 422	Electromagnetism	4
Third term of first-year second-language sequence		4
Core-education course in social science		4
Elective course		4
<b>Credits</b>		<b>16</b>
<b>Total Credits</b>		<b>48</b>

Course	Title	Credits	Milestones
<b>Fourth Year</b>			
<b>Fall</b>			
PHYS 414	Quantum Physics	4	
First term of second-year second-language sequence		4	
Elective courses		8	
<b>Credits</b>		<b>16</b>	
<b>Winter</b>			
PHYS 415	Quantum Physics	4	
PHYS 431	Analog Electronics	4	
Second term of second-year second-language sequence		4	
Elective course		4	
<b>Credits</b>		<b>16</b>	
<b>Spring</b>			
PHYS 417	Topics in Quantum Physics	4	
PHYS 432	Digital Electronics	4	
Third term of second-year second-language sequence		4	
Elective course		4	
<b>Credits</b>		<b>16</b>	
<b>Total Credits</b>		<b>48</b>	

## Bachelor of Science in Physics

Course	Title	Credits	Milestones
<b>First Year</b>			
<b>Fall</b>			
PHYS 251	Foundations of Physics I	4	
PHYS 290	Foundations of Physics Laboratory	1	
CH 221	General Chemistry I	4	
MATH 251	Calculus I	4	
WR 121Z	Composition I	4	
<b>Credits</b>		<b>17</b>	
<b>Winter</b>			
PHYS 252	Foundations of Physics I	4	
PHYS 290	Foundations of Physics Laboratory	1	
CH 222	General Chemistry II	4	
MATH 252	Calculus II	4	

WR 122Z	Composition II	4
<b>Credits</b>		<b>17</b>

**Spring**

PHYS 253	Foundations of Physics I	4
PHYS 290	Foundations of Physics Laboratory	1
MATH 253	Calculus III	4
CS 210	Computer Science I	4
Core-education course in arts and letters		4
<b>Credits</b>		<b>17</b>
<b>Total Credits</b>		<b>51</b>

Course	Title	Credits	Milestones
--------	-------	---------	------------

**Second Year**
**Fall**

PHYS 351	Foundations of Physics II	4
PHYS 391	Physics Experimentation Data Analysis Laboratory	4
MATH 281	Several-Variable Calculus I	4
Core-education course in arts and letters		4
<b>Credits</b>		<b>16</b>

**Winter**

PHYS 352	Foundations of Physics II	4
MATH 282	Several-Variable Calculus II	4
Core-education course in social science		4
Core-education course that also satisfies a cultural literacy requirement		4
<b>Credits</b>		<b>16</b>

**Spring**

PHYS 353	Foundations of Physics II	4
MATH 256	Introduction to Differential Equations	4
Core-education course in arts and letters		4
Core-education course in social science		4
<b>Credits</b>		<b>16</b>
<b>Total Credits</b>		<b>48</b>

Course	Title	Credits	Milestones
--------	-------	---------	------------

**Third Year**
**Fall**

PHYS 412	Mechanics, Electricity, and Magnetism	4
Core-education course in arts and letters		4
Core-education course in social science		4
Core-education course that also satisfies a cultural literacy requirement		4
<b>Credits</b>		<b>16</b>

**Winter**

PHYS 411	Mechanics, Electricity, and Magnetism	4
PHYS 413	Mechanics, Electricity, and Magnetism	4
Core-education course in social science		4
Elective course		4
<b>Credits</b>		<b>16</b>

**Spring**

PHYS 422	Electromagnetism	4
----------	------------------	---

Elective courses		12
<b>Credits</b>		<b>16</b>
<b>Total Credits</b>		<b>48</b>

Course	Title	Credits	Milestones
--------	-------	---------	------------

**Fourth Year**
**Fall**

PHYS 414	Quantum Physics	4
Elective courses		12
<b>Credits</b>		<b>16</b>

**Winter**

PHYS 415	Quantum Physics	4
PHYS 431	Analog Electronics	4
Elective courses		8
<b>Credits</b>		<b>16</b>

**Spring**

PHYS 417	Topics in Quantum Physics	4
PHYS 432	Digital Electronics	4
Elective courses		8
<b>Credits</b>		<b>16</b>
<b>Total Credits</b>		<b>48</b>