

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:

- Understand principles and concepts of core subject areas in Physics.
- Apply physical principles and concepts to analyze problems.
- Apply quantitative methods and concepts to analyze problems.
- Analyze and interpret quantitative results.
- Analyze complex problems by integrating concepts across multiple core areas.
- Collect and analyze data working independently and in collaboration with others (experimentation; data collection; analysis; model-based computation including simulations; and literature research).
- Communicate orally and in writing, making appropriate use of current presentation technology.
- Be familiar with current developments in physics.

Physics Major Requirements

Courses used to fulfill the major requirements must be taken for letter grade. [Coursework transferred in from Advanced Placement or International Baccalaureate exams are acceptable with a mark of P*.](#)

Physics majors must keep an average Physics GPA of 2.0 or better in all Physics/Astronomy Courses.

Code	Title	Credits
Physics Core Courses		
MATH 251Z–252Z	Calculus: Differential/Integral	8
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 ¹	2
PHYS 351	Foundations of Physics II	4
PHYS 391	Physics Experimentation Data Analysis Laboratory	4
Select one of the options:		4-8
Option A (4 credits):		
PHYS 389	Mathematical Methods	
Option B (8 credits):		
MATH 253Z & MATH 341	Calculus: Sequences and Series and Elementary Linear Algebra	
Required Advanced Courses		

PHYS 352	Thermal Physics and Statistical Mechanics I	4
PHYS 411	Mechanics	4
PHYS 412	Electricity and Magnetism I	4
PHYS 414	Quantum Physics	4
Interdisciplinary Science Core		
Two from the following: ²		8
CH 221Z	General Chemistry I	
CH 221HZ	General Chemistry I	
CH 222Z	General Chemistry II	
CH 222HZ	General Chemistry II	
BI 214	General Biology IV: Biochemistry and Genetics	
BI 221Z	Principles of Biology: Cells	
BI 222Z	Principles of Biology: Organisms	
BI 223Z	Principles of Biology: 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	
Physics or Astronomy Upper-Division Courses ^{3, 4}		22
Total Credits		92-96

¹ To be repeated, totaling 2 credits.

² Students are strongly urged to complete this requirement in the first two years.

³ The advanced courses span a range of both fundamental and applied topics. Students may take the subsequent courses in the multi-term Thermal and Statistical Physics (PHYS 353), Electricity and Magnetism (PHYS 412), or Quantum Physics (PHYS 415 and 417) series, other upper-division physics courses, or at most one upper-division astronomy course. Of the 22 credits, **6 must be research/lab credits and/or Advanced Projects Lab**; and up to 12 credits of lab work may count toward the 22-credit requirement. Some courses can fill either the lab credit requirement or the non-lab requirement -- for instance, Analog Electronics (PHYS 431) or Digital Electronics (PHYS 432). Note the prerequisites for advanced courses.

⁴ Students may apply no more than 4 total credits from ASTR 320, ASTR 321, and ASTR 322 towards the PHYS major.

Approved Research/Lab Credits/Advanced Projects Lab Courses

Code	Title	Credits
PHYS 401	Research: [Topic]	1-16
PHYS 424	Classical Optics	4
PHYS 425	Lab Projects in Modern Optics	4
PHYS 431	Analog Electronics	4
PHYS 432	Digital Electronics	4
PHYS 433	Radiofrequency and Low-noise Measurements	4
PHYS 481	Design of Experiments	4
PHYS 491	Research Project I	2-4
PHYS 492	Research Project II	2-4

PHYS 493	Research Project III	2-4
PHYS 495	Nanofabrication	4

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
First Year		
Fall		
PHYS 251 or PHYS 201	Foundations of Physics I or General Physics	4
PHYS 290	Foundations of Physics Laboratory	1
CH 221Z	General Chemistry I	4
MATH 251Z or MATH 111Z or MATH 112Z	Differential Calculus or Precalculus I: Functions or Precalculus II: Trigonometry	4
WR 121Z	Composition I	4
Credits		17
Winter		
PHYS 252 or MATH 251Z or MATH 112Z	Foundations of Physics I or Differential Calculus or Precalculus II: Trigonometry	4
PHYS 290	Foundations of Physics Laboratory	1
CH 222Z	General Chemistry II	4
MATH 252Z	Integral Calculus	4
WR 122Z	Composition II	4
Credits		17
Spring		
PHYS 253 or MATH 251Z	Foundations of Physics I or Differential Calculus	4
PHYS 290	Foundations of Physics Laboratory	1
MATH 253Z or MATH 251Z	Calculus: Sequences and Series or Differential Calculus	4
CS 210	Computer Science I	4
Core-education course in arts and letters		4
Credits		17

Second Year

Fall

PHYS 351	Foundations of Physics II	4
MATH 281 or MATH 253Z	Several-Variable Calculus I or Calculus: Sequences and Series	4
PHYS 391	Physics Experimentation Data Analysis Laboratory	4
Core-education course in arts and letters		4
Credits		16

Winter

PHYS 353	Thermal Physics and Statistical Mechanics II	4
MATH 282 or MATH 281	Several-Variable Calculus II or Several-Variable Calculus I	4
Core-education course in social science		4
Core-education course that also satisfies a cultural literacy requirement		4
Credits		16

Spring

PHYS 353	Thermal Physics and Statistical Mechanics II	4
MATH 256 or MATH 282	Introduction to Differential Equations or Several-Variable Calculus II	4
Core-education course in arts and letters		4
Core-education course in social science		4
Credits		16

Third Year

Fall

PHYS 412	Electricity and Magnetism I	4
Core-education course in arts and letters		4
Core-education course that also satisfies a cultural literacy requirement		4
First term of 1st-year second-language sequence		4
Credits		16

Winter

PHYS 411	Mechanics	4
PHYS 413	Electricity and Magnetism II	4
Core-education course in social science		4
Second term of 1st-year second-language sequence		4
Credits		16

Spring

PHYS 422	Electromagnetism	4
Third term of 1st-year second-language sequence		4
Core-education course in social science		4
Elective course		4
Credits		16

Fourth Year

Fall

PHYS 414	Quantum Physics	4
First term of 2nd-year second-language sequence		4

Elective course	4
Credits	12
Winter	
PHYS 415 Quantum Physics	4
PHYS 431 Analog Electronics	4
Second term of 2nd-year second-language sequence	4
Credits	12
Spring	
PHYS 417 Topics in Quantum Physics	4
PHYS 432 Digital Electronics	4
Third term of 2nd-year second-language sequence	4
Credits	12
Total Credits	183

Bachelor of Science in Physics

Course	Title	Credits	Milestones
First Year			
Fall			
PHYS 251	Foundations of Physics I	4	
PHYS 290	Foundations of Physics Laboratory	1	
CH 221Z	General Chemistry I	4	
MATH 251Z	Differential Calculus	4	
WR 121Z	Composition I	4	
Credits		17	
Winter			
PHYS 252	Foundations of Physics I	4	
PHYS 290	Foundations of Physics Laboratory	1	
CH 222Z	General Chemistry II	4	
MATH 252Z	Integral Calculus	4	
WR 122Z	Composition II	4	
Credits		17	
Spring			
PHYS 253	Foundations of Physics I	4	
PHYS 290	Foundations of Physics Laboratory	1	
MATH 253Z	Calculus: Sequences and Series	4	
CS 210	Computer Science I	4	
Core-education course in arts and letters		4	
Credits		17	
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	
Credits		16	
Winter			
PHYS 352	Thermal Physics and Statistical Mechanics I	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
Credits	16
Spring	
PHYS 353 Thermal Physics and Statistical Mechanics II	4
MATH 256 Introduction to Differential Equations	4
Core-education course in arts and letters	4
Core-education course in social science	4
Credits	16
Third Year	
Fall	
PHYS 412 Electricity and Magnetism I	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
Credits	16
Winter	
PHYS 411 Mechanics	4
PHYS 413 Electricity and Magnetism II	4
Core-education course in social science	4
Elective course	4
Credits	16
Spring	
PHYS 422 Electromagnetism	4
Elective courses	12
Credits	16
Fourth Year	
Fall	
PHYS 414 Quantum Physics	4
Elective courses	8
Credits	12
Winter	
PHYS 415 Quantum Physics	4
PHYS 431 Analog Electronics	4
Elective course	4
Credits	12
Spring	
PHYS 417 Topics in Quantum Physics	4
PHYS 432 Digital Electronics	4
Elective course	4
Credits	12
Total Credits	183