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

Courses used to fulfill the major requirements must be taken for letter grade and passed with a grade of mid-C or better. <u>Coursework</u> transferred in from Advanced Placement or International Baccalaureate exams are acceptable with a mark of P*.

Code	Title	Credits		
Physics Core Courses				
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 ¹	2		
PHYS 351-353	Foundations of Physics II	12		
PHYS 391	Physics Experimentation Data Analysis Laboratory	4		
Interdisciplinary Science Core				
Two from the follo	owing: ²	8		
CH 221	General Chemistry I			

Total Credits		92
Astronomy or P	Physics Upper-Division Courses ³	30
HPHY 212	Scientific Investigation in Physiology	
ERTH 201	Dynamic Planet Earth	
CS 212	Computer Science III	
CS 211	Computer Science II	
CS 210	Computer Science I	
BI 213	General Biology III: Ecology and Evolution	
BI 212	General Biology II: Organisms	
BI 211	General Biology I: Cells	
CH 225H	Advanced General Chemistry II	
CH 224H	Advanced General Chemistry I	
CH 222	General Chemistry II	

¹ To be repeated, totaling 2 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
First Year		
Fall		
PHYS 251 or PHYS 20	Foundations of Physics I or General Physics 1	4
PHYS 290	Foundations of Physics Laboratory	1
CH 221	General Chemistry I	4
MATH 251 or MATH 11 or	Calculus I or Precalculus I: Functions 12 or Precalculus II: Trigonometry	4
MATH 11	27	
WR 121Z	Composition I	4
	Credits	17

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

Students must complete a minimum of 6 credits in upper-division laboratory courses from any combination of PHYS 401, 424, 425, 431, 432, 491, 492, and 493. A maximum of 12 credits from these courses may count toward the major.

Core-education course in arts and letters

Winter			Core-educati	on course in social science	4
PHYS 252	Foundations of Physics I	4		Credits	16
or	or Calculus I			Total Credits	48
MATH 251	or Precalculus II: Trigonometry				
or			Course	Title	Credits Milestone
MATH 112	Z		Third Year		
PHYS 290	Foundations of Physics Laboratory	1	Fall		
CH 222	General Chemistry II	4	PHYS 412	Electricity and Magnetism I	4
MATH 252	Calculus II	4		on course in arts and letters	4
WR 122Z	Composition II	4		on course that also satisfies a cultural	4
	Credits	17	literacy requi		
Spring			First term of	first-year second-language sequence	4
PHYS 253	Foundations of Physics I	4		Credits	16
or	or Calculus I	•	Winter		
MATH 251			PHYS 411	Mechanics	4
PHYS 290	Foundations of Physics Laboratory	1	PHYS 413	Electricity and Magnetism II	4
MATH 253	Calculus III	4	Core-educati	on course in social science	4
or	or Calculus I		Second term	of first-year second-language sequence	4
MATH 251				Credits	16
CS 210	Computer Science I	4	Spring		
Core-education	on course in arts and letters	4	PHYS 422	Electromagnetism	4
	Credits	17	Third term of	first-year second-language sequence	4
	Total Credits	51	Core-educati	on course in social science	4
			Elective cour	se	4
Course	Title	Credits Milestones		Credits	16
Second Year				Total Credits	48
Second Year Fall				Total Credits	48
	Foundations of Physics II	4	Course	Total Credits Title	48 Credits Milestone
Fall		4	Course Fourth Year	Title	
Fall PHYS 351	Foundations of Physics II			Title	
Fall PHYS 351 MATH 281	Foundations of Physics II Several-Variable Calculus I or Calculus III		Fourth Year	Title	
Fall PHYS 351 MATH 281 or	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis		Fourth Year Fall PHYS 414	Title Quantum Physics	Credits Milestone
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory	4	Fourth Year Fall PHYS 414 First term of	Title Quantum Physics second-year second-language sequence	Credits Milestone
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis	4	Fourth Year Fall PHYS 414	Title Quantum Physics second-year second-language sequence	Credits Milestone 4 4 8
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory	4	Fourth Year Fall PHYS 414 First term of a	Title Quantum Physics second-year second-language sequence	Credits Milestone 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters	4	Fourth Year Fall PHYS 414 First term of Elective cour Winter	Title Quantum Physics second-year second-language sequence ses Credits	Credits Milestone 4 4 8 16
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical	4	Fourth Year Fall PHYS 414 First term of a Elective cour Winter PHYS 415	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics	Credits Milestone 4 4 8 16
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits	4 4 16	Fourth Year Fall PHYS 414 First term of a Elective cour Winter PHYS 415 PHYS 431	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics	4 4 8 16 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II	4 4 16	Fourth Year Fall PHYS 414 First term of the Elective cour Winter PHYS 415 PHYS 431 Second term	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics	Credits Milestone 4 4 8 16
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I	4 4 4 16	Fourth Year Fall PHYS 414 First term of a Elective cour Winter PHYS 415 PHYS 431 Second term sequence	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language	4 4 8 16 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or MATH 281	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I	4 4 16 4	Fourth Year Fall PHYS 414 First term of the Elective cour Winter PHYS 415 PHYS 431 Second term	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language	4 4 8 16 4 4 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or MATH 281 Core-education	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I	4 4 16 4 4	Fourth Year Fall PHYS 414 First term of an Elective cour Winter PHYS 415 PHYS 431 Second term sequence Elective cour	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language	4 4 8 16 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or MATH 281 Core-education Core-education	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I on course in social science on course that also satisfies a cultural	4 4 16 4	Fourth Year Fall PHYS 414 First term of a Elective cour Winter PHYS 415 PHYS 431 Second term sequence Elective cour	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language se Credits	4 4 8 16 4 4 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or MATH 281 Core-education	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I on course in social science on course that also satisfies a cultural ement	4 4 16 4 4 4	Fourth Year Fall PHYS 414 First term of Elective cour Winter PHYS 415 PHYS 431 Second term sequence Elective cour Spring PHYS 417	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language se Credits Topics in Quantum Physics	4 4 8 16 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or MATH 281 Core-education Core-education Core-education Literacy requires	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I on course in social science on course that also satisfies a cultural	4 4 16 4 4	Fourth Year Fall PHYS 414 First term of an Elective cour Winter PHYS 415 PHYS 431 Second term sequence Elective cour Spring PHYS 417 PHYS 432	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language se Credits Topics in Quantum Physics Digital Electronics	4 4 8 16 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or MATH 281 Core-education Core-education Core-education Iteracy requires	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I on course in social science on course that also satisfies a cultural ement Credits	4 4 16 4 4 4 4 16	Fourth Year Fall PHYS 414 First term of an Elective cour Winter PHYS 415 PHYS 431 Second term sequence Elective cour Spring PHYS 417 PHYS 432 Third term of	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language se Credits Topics in Quantum Physics Digital Electronics second-year second-language sequence	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or MATH 281 Core-education Core-education Core-education Literacy requires	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I on course in social science on course that also satisfies a cultural ement Credits Thermal Physics and Statistical	4 4 16 4 4 4	Fourth Year Fall PHYS 414 First term of an Elective cour Winter PHYS 415 PHYS 431 Second term sequence Elective cour Spring PHYS 417 PHYS 432	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language se Credits Topics in Quantum Physics Digital Electronics second-year second-language sequence see	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or MATH 281 Core-education Core-education iteracy requires Spring PHYS 353	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I on course in social science on course that also satisfies a cultural ement Credits Thermal Physics and Statistical Mechanics II	4 4 16 4 4 4 16 4	Fourth Year Fall PHYS 414 First term of an Elective cour Winter PHYS 415 PHYS 431 Second term sequence Elective cour Spring PHYS 417 PHYS 432 Third term of	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language se Credits Topics in Quantum Physics Digital Electronics second-year second-language sequence	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
Fall PHYS 351 MATH 281 or MATH 253 PHYS 391 Core-education Winter PHYS 353 MATH 282 or MATH 281 Core-education Core-education Core-education Iteracy requires	Foundations of Physics II Several-Variable Calculus I or Calculus III Physics Experimentation Data Analysis Laboratory on course in arts and letters Credits Thermal Physics and Statistical Mechanics II Several-Variable Calculus II or Several-Variable Calculus I on course in social science on course that also satisfies a cultural ement Credits Thermal Physics and Statistical	4 4 16 4 4 4 4 16	Fourth Year Fall PHYS 414 First term of an Elective cour Winter PHYS 415 PHYS 431 Second term sequence Elective cour Spring PHYS 417 PHYS 432 Third term of	Title Quantum Physics second-year second-language sequence ses Credits Quantum Physics Analog Electronics of second-year second-language se Credits Topics in Quantum Physics Digital Electronics second-year second-language sequence see	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4

16

48

Bachelo	r of Science in Physics	
Course	Title	Credits Mileston
First Year		
Fall		
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
	Credits	17
Winter		
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
	Credits	17
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	on course in arts and letters	4
	Credits	17
	Total Credits	51

Course Second Yea	Title r	Credits Milestones
Fall		
PHYS 351	Foundations of Physics II	4
PHYS 391	Physics Experimentation Data Analysis Laboratory	4
MATH 281	Several-Variable Calculus I	4
Core-educati	ion 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-educati	ion course in social science	4
Core-educati	ion course that also satisfies a cultural rement	4
	Credits	16
Spring		
PHYS 353	Thermal Physics and Statistical Mechanics II	4
MATH 256	Introduction to Differential Equations	4
Core-educat	ion course in arts and letters	4
Core-educati	ion course in social science	4
	Credits	16
	Total Credits	48

Course Third Year Fall	Title	Credits Milestones
PHYS 412	Electricity and Magnetism I	4
Core-education	on course in arts and letters	4
Core-education	on course in social science	4
Core-education literacy requires	on course that also satisfies a cultural ement	4
	Credits	16
Winter		
PHYS 411	Mechanics	4
PHYS 413	Electricity and Magnetism II	4
Core-education	on course in social science	4
Elective cours	se	4
	Credits	16
Spring		
PHYS 422	Electromagnetism	4
Elective cours	ses	12
	Credits	16
	Total Credits	48
Course	Title	Credits Milestones
Fourth Year		
Fall		
PHYS 414	Quantum Physics	4
Elective cours	ses	12
	Credits	16
Winter		
PHYS 415	Quantum Physics	4
PHYS 431	Analog Electronics	4
Elective cours	ses	8
Spring	Credits	16
Spring PHYS 417	Topics in Quantum Physics	4
PHYS 432	Topics in Quantum Physics Digital Electronics	4
Elective cours	•	8
Liective cours	000	0

Credits

Total Credits