Physics, BS

Learning Outcomes

Physics majors will be able to:

- demonstrate competency in applying the basic laws of physics in classical and quantum mechanics, electromagnetism, thermodynamics, and statistical physics;
- solve complex, real-world problems using the principles of physics; and
- demonstrate competency in using basic instrumentation and in analyzing the data obtained.

Requirements

The Bachelor of Science with a major in physics requires a minimum of 120 s.h., including at least 55 s.h. of work for the major (minimum of 42 s.h. in physics plus 16 s.h. in supporting coursework). Students must maintain a grade-point average of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences GE CLAS Core.

Students must complete several required mathematics courses in addition to their required physics core. The department offers a wide range of upper-level electives and students are encouraged to explore different research areas. All students are strongly encouraged to get involved with research.

Students who earn a BS in physics may not earn a BS in applied physics or a BA in physics.

The BS with a major in physics requires the following courses or their equivalents. Substitutions may be allowed by exception through the department.

Requirements	Hours
Mathematics Courses	13-16
Introductory Physics Courses	8-12
Physics Core Courses	25
Upper-Level Elective Courses	9-11

Mathematics Courses

Course #	Title	Hours
All of these:		
MATH:1850	Calculus I	4
MATH:1860	Calculus II	4
MATH:2700	Introduction to Linear Algebra	4
MATH:2850	Calculus III	4
Or all of these:		
MATH:1550	Engineering Mathematics I: Single Variable Calculus	4
MATH:1560	Engineering Mathematics II: Multivariable Calculus	4
MATH:2550	Engineering Mathematics III: Matrix Algebra	2
MATH:3550	Engineering Mathematics V: Vector Calculus	3

Introductory Physics Courses

Course #	Title	Hours
These three courses:		
PHYS:1701	Physics I	4
PHYS:1702	Physics II	4
PHYS:2703	Physics III	4
Or these two courses:		
PHYS:1611	Introductory Physics I	4
PHYS:1612	Introductory Physics II	4

Physics Core Courses

Course #	Title	Hours
All of these:		
PHYS:2704	Physics IV	4
PHYS:3710	Intermediate Mechanics	3
PHYS:3730	Statistical Physics	3
PHYS:3741	Introduction to Quantum Mechanics I	3
PHYS:3742	Introduction to Quantum Mechanics II	3
PHYS:3756	Intermediate Laboratory	3
PHYS:3811	Electricity and Magnetism I	3
PHYS:3812	Electricity and Magnetism II	3

Upper-Level Elective Courses

Students can only take these courses once: PHYS:3850 Electronics, PHYS:4750 Advanced Laboratory, or ASTR:4850 Observational Techniques in Astronomy.

Undergraduate majors who plan to pursue graduate study are advised to go as far as they can beyond the minimum requirements listed below, including further work in mathematics.

Course #	Title	Hours
One of these:		
PHYS:3850	Electronics	4
PHYS:4750	Advanced Laboratory	3
ASTR:4850	Observational Techniques in Astronomy	3
Two of these:		
PHYS:3850	Electronics	4
PHYS:4720	Introductory Optics	3
PHYS:4726	Electro Optics	3
PHYS:4728	Introductory Solid State Physics	3
PHYS:4731	Plasma Physics I	3
PHYS:4740	Elementary Particles and Nuclear Physics	3
PHYS:4750	Advanced Laboratory	3
PHYS:4761	Mathematical Methods of Physics I	3
PHYS:4762	Mathematical Methods of Physics II	3
PHYS:4820	Optical Signal Processing	3
PHYS:4860	Computational Physics	3
PHYS:4905	Special Topics in Physics	3
PHYS:5905	Special Topics in Physics	3
ASTR:3771	Introduction to Astrophysics I	3

ASTR:3772	Introduction to Astrophysics II	3
ASTR:4850	Observational Techniques in Astronomy	3

In planning this work, they should be guided by the College of Liberal Arts and Sciences maximum hours rule: students earning a BS may apply a maximum of 56 s.h. earned in one department to the minimum 120 s.h. required for graduation, whether or not the coursework is accepted toward the requirements for the major. Students who earn more than 56 s.h. from one department may use the additional semester hours to satisfy requirements for the major (if the department accepts them), and the grades they earn become part of their grade-point average, but they cannot apply the additional semester hours to the minimum 120 s.h. required for graduation.

Teacher Licensure

Students interested in teaching in elementary and/or secondary schools should seek admission to the Teacher Education Program (TEP) in the College of Education.

To qualify for licensure in secondary teaching, students in the TEP complete a degree in education as well as a related College of Liberal Arts and Sciences degree. See Apply on the College of Education website for details on requirements and deadlines for applying to the College of Education and about TEP choices of majors leading to licensure.

Double Major in Physics and Astronomy

Students working toward a Bachelor of Science with a double major in physics and in astronomy must complete all requirements for both majors and must earn a minimum of 56 s.h. outside the Department of Physics and Astronomy in order to graduate. Students interested in earning a double major should consult with their advisors. See Requirements for a Bachelor's Degree on the College of Liberal Arts and Sciences website.

Honors

Honors in the Major

Students majoring in physics have the opportunity to graduate with honors in their major. They must maintain a University of Iowa grade-point average (GPA) of at least 3.33. During their junior and senior years, students must conduct an investigation under the guidance of a faculty member. Students must present a written report of their research (honors thesis) and describe their research results at a departmental seminar.

University of Iowa Honors Program

In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the university's honors program.

Membership in the UI Honors Program is not required to earn honors in the physics major.

Career Advancement

Physics graduates have mastered skills that are readily transferable to a number of fields. They might choose to work in research, engineering, software development, teaching, finance, biomedical research, or consulting.

The degree provides preparation for careers in industry, employment in research laboratories, and graduate study in physics and related sciences.

About 70% of physics and astronomy graduates go on to graduate school. With help from the department’s in-house recruiting office, they win acceptance to some of the best graduate programs in the country.

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.

Academic Plans

Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the university's Four-Year Graduation Plan. Courses in the major are those required to complete the major; they may be offered by departments other than the major department.

Before the third semester begins: MATH:1860 Calculus II and PHYS:1702 Physics II.

Before the fifth semester begins: PHYS:2703 Physics III, PHYS:2704 Physics IV, MATH:2700 Introduction to Linear Algebra, MATH:2850 Calculus III, and up to two more courses in the major.

Before the seventh semester begins: two to four more courses in the major and at least 90 s.h. earned toward the degree.

Before the eighth semester begins: two or three more courses in the major.

During the eighth semester: enrollment in all remaining coursework in the major, all remaining GE CLAS Core courses, and a sufficient number of semester hours to graduate.

Sample Plan of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

Physics, BS

Course	Title	Hours
Academic Career		
Any Semester		
Research: students are strongly encouraged to be active participants in research within the department.		
GE CLAS Core: Sustainability [a]		
	Hours	**0**
First Year		
Fall		
PHYS:1701	Physics I	4
MATH:1850	Calculus I [b]	4

RHET:1030 or ENGL:1200	Rhetoric or The Interpretation of Literature	3 - 4
GE CLAS Core: Social Sciences [c]		3
CSI:1600	Success at Iowa	2
	Hours	**16-17**
Spring		
PHYS:1702	Physics II	4
MATH:1860	Calculus II	4
RHET:1030 or ENGL:1200	Rhetoric or The Interpretation of Literature	3 - 4
GE CLAS Core: Diversity and Inclusion [c]		3
	Hours	**14-15**
Second Year		
Fall		
PHYS:2703	Physics III	4
MATH:2700	Introduction to Linear Algebra	4
GE CLAS Core: Values and Culture [c]		3
GE CLAS Core: World Languages First Level Proficiency or elective course [d]		4 - 5
	Hours	**15-16**
Spring		
PHYS:2704	Physics IV	4
PHYS:3710	Intermediate Mechanics	3
MATH:2850	Calculus III	4
GE CLAS Core: World Languages Second Level Proficiency or elective course [d]		4 - 5
	Hours	**15-16**
Third Year		
Fall		
PHYS:3741	Introduction to Quantum Mechanics I	3
PHYS:3811	Electricity and Magnetism I	3
GE CLAS Core: Historical Perspectives [c]		3
GE CLAS Core: World Languages Third Level Proficiency or elective course [d]		4 - 5
Elective course [e]		1 - 3
	Hours	**14-17**
Spring		
PHYS:3742	Introduction to Quantum Mechanics II	3
PHYS:3812	Electricity and Magnetism II	3
PHYS:3850	Electronics [f]	4
GE CLAS Core: World Languages Fourth Level Proficiency or elective course [d]		4 - 5
	Hours	**14-15**
Fourth Year		
Fall		
PHYS:3730	Statistical Physics	3
PHYS:3756	Intermediate Laboratory [f]	3
Major: upper-level physics course		3
GE CLAS Core: Literary, Visual, and Performing Arts [c]		3
Elective course [e]		3
	Hours	**15**
Spring		
Major: upper-level physics course		3
GE CLAS Core: International and Global Issues [c]		3
Elective course [e]		3
Elective course [e]		3
Elective course [e]		3
Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) [g]		
	Hours	**15**
	Total Hours	**118-126**

a Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative and Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Culture.

b Enrollment in math courses requires completion of a placement exam.

c GE CLAS Core courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses.

d Students who have completed four years of a single language in high school have satisfied the GE CLAS Core World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.

e Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

f Students who choose PHYS:3850 as one of their two required laboratory courses are advised to take it before they take PHYS:3756 Intermediate Laboratory.

g Please see Academic Calendar, Office of the Registrar website for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Graduation Services.