

Physics, Computation (BSPhy)

All aspects of the physical universe are of interest to the physicist, who seeks to understand not only the smallest forms of matter and the rich phenomena present in our everyday lives but also the universe itself. Physics has played a critical role in human technological and intellectual development during the twentieth century. The tools of the physicist—observation, imagination, model building, prediction, and deduction—will enable physics to continue this influence into the new century. The Bachelor of Science in Physics degree program is designed to provide the skills, understanding, and outlook required for participation in the discovery of new knowledge about nature.

The Bachelor of Science in Physics program is balanced and broad. It is designed to give the student a strong foundation for graduate study or work in physics and, with additional training, for work in a variety of other areas, such as astronomy, astrophysics, biophysics, chemical physics, computer science, engineering, geophysics, mathematics, medicine, physics teaching, and space sciences. Students who end their formal training with the bachelor's degree may seek employment in industry, in national laboratories, or in teaching; they should consider the options in computation, radiation physics, space sciences, biophysics, and teaching, which augment the broad instruction provided by the basic Bachelor of Science in Physics.

This concentration is designed to provide the necessary foundation and hands-on skill in computation for the student who plans a career or further study in computational physics or computer science. Students who complete this option may simultaneously fulfill some of the requirements of the [Scientific Computation and Data Sciences Certificate](#).

Total Hours Required: 126

Plan of Study

The Plan of Study is a suggested four-year course sequence to support academic planning and serves as a helpful guide. Currently enrolled students should meet with their academic advisor to tailor their course selections and timelines to their individual goals and circumstances.

Course	Title	Hours
Year 1		
Semester 1		
M 408C	Differential and Integral Calculus	4
CH 301	Principles of Chemistry I	3
RHE 306	Rhetoric and Writing	3
First-Year Signature Course (090)		3
American and Texas Government (070)		3
Hours		16
Semester 2		
M 408D	Sequences, Series, and Multivariable Calculus	4
PHY 301	Mechanics	3
PHY 101L	Laboratory for Physics 301	1
CH 302	Principles of Chemistry II	3
Visual and Performing Arts (050)		3
American and Texas Government (070)		3
Hours		17
Year 2		
Semester 1		
M 427J	Differential Equations with Linear Algebra	4
PHY 316	Electricity and Magnetism	3
PHY 116L	Laboratory for Physics 316	1

C S 303E	Elements of Computers and Programming	3
Foreign Language other than English, Beginning Proficiency		3
Free Elective		3
Hours		17
Semester 2		
M 427L	Advanced Calculus for Applications II	4
PHY 315	Wave Motion and Optics	3
PHY 115L	Laboratory for Physics 315	1
PHY 355	Modern Physics and Thermodynamics	3
Foreign Language other than English, Beginning Proficiency		3
Free Elective		3
Hours		17
Year 3		
Semester 1		
PHY 355	Modern Physics and Thermodynamics	3
PHY 336K	Classical Dynamics	3
Hours chosen from: upper-division Math		3
Hours chosen from: AST, BIO, or GEO		3
U.S. History (060)		3
Hours		15
Semester 2		
PHY 338K	Electronic Techniques	3
PHY 353L	Modern Physics Laboratory	3
Hours chosen from: upper-division Math		3
Science Computation Course		3
U.S. History (060)		3
Hours		15
Year 4		
Semester 1		
PHY 329	Introduction to Computational Physics	3
PHY 352K	Classical Electrodynamics I	3
Science Computation Course		3
Social and Behavioral Sciences (080)		3
Free Elective		3
Hours		15
Semester 2		
PHY 369	Thermodynamics and Statistical Mechanics	3
PHY 373	Quantum Physics I: Foundations	3
Hours chosen from: AST, BIO, or GEO		3
Humanities (040)		3
Free Elective		2
Hours		14
Total Hours		126

Requirements

All requirements are listed below, starting with the most specialized moving to the most general. Additional requirements may follow the table, so be sure to read the entire page. Some required courses listed below may also satisfy [General Education](#) requirements, including [Core Curriculum](#).

Code	Title	Hours
Concentration		
CH 301	Principles of Chemistry I	3
or CH 301C	Foundations of Chemistry I	
CH 302	Principles of Chemistry II	3
or CH 302C	Foundations of Chemistry II	
Hours chosen from: biology, geological sciences, or astronomy (a course may not be used to fulfill this requirement if it cannot be counted toward major requirements in the department that offers it)		6
M 408C	Differential and Integral Calculus	4
M 408D	Sequences, Series, and Multivariable Calculus (or the equivalent)	4

Hours chosen from:		4
M 427J	Differential Equations with Linear Algebra	
M X27K & M X27L	Advanced Calculus for Applications I and Advanced Calculus for Applications II	
Hours chosen from: upper-division mathematics or statistics and data sciences (M 362K is recommended; only courses at the level of calculus and above may be counted toward the total number of hours required for the degree)		6
PHY 329	Introduction to Computational Physics (or equivalent)	3
PHY 336K	Classical Dynamics (or equivalent)	3
PHY 338K	Electronic Techniques (or equivalent)	3
PHY 352K	Classical Electrodynamics I (or equivalent)	3
PHY 353L	Modern Physics Laboratory (or equivalent)	3
PHY 355	Modern Physics and Thermodynamics (or equivalent)	3
PHY 369	Thermodynamics and Statistical Mechanics (or equivalent)	3
PHY 373	Quantum Physics I: Foundations (or equivalent)	3
Hours chosen from one of the following scientific computation options:		12
Sequence 1		
C S 303E	Elements of Computers and Programming	
C S 313E	Elements of Software Design	
Select two courses from two of the following areas: Numerical Methods, Statistical Methods, Other Computing Topics (See Course List Tab)		
Sequence 2		
ECE 306	Introduction to Computing	
ECE 312	Software Design and Implementation I	
ECE 316	Digital Logic Design	
ECE 319K	Introduction to Embedded Systems	
ECE 422C	Software Design and Implementation II	
Subtotal		66
Major (see details below)		12
Degree (see details below)		6
Free electives: Additional coursework to reach total hours required.		0
Subtotal		18
General Education		
Core Curriculum		42
Foreign Language other than English, Beginning Proficiency		
Subtotal		42
College Requirements - Natural Sciences		
General University Requirements		
Total Hours		126

Major-Physics (BSPHy)

Code	Title	Hours
PHY 301	Mechanics	3
PHY 101L	Laboratory for Physics 301	1
PHY 316	Electricity and Magnetism	3
PHY 116L	Laboratory for Physics 316	1
PHY 315	Wave Motion and Optics	3
PHY 115L	Laboratory for Physics 315	1
Total Hours		12

Degree-Bachelor of Science in Physics

Code	Title	Hours
Foreign Language/Culture Choices		
One of the following foreign language/culture choices: (Students in Teaching and Physics Honors concentrations are exempt from this requirement)		6
<u>Foreign Language other than English, Beginning Proficiency</u>		
First course in a foreign language and a three-semester-hour course in the culture of the same language area		
Total Hours		6

Additional Requirements and Policies

Students in all options must fulfill both the University's [General Requirements](#) for graduation and the [college requirements](#). They must also earn a grade of at least C- in each mathematics and science course required for the degree, and a grade point average in these courses of at least 2.00. More information about grades and the grade point average is given in the [General Information Catalog](#).

Upper-division Coursework

At least 21 semester hours of upper-division coursework, including at least 12 semester hours of upper-division coursework in physics, must be completed in residence at the University.

Numerical Methods

Code	Title	Hours
CHE 348	Numerical Methods in Chemical Engineering and Problem Solving	3
C S 323E	Elements of Scientific Computing	3
C S 323H	Elements of Scientific Computing: Honors	3
C S 367	Numerical Methods	3
M 348	Scientific Computation in Numerical Analysis	3

Statistical Methods

Code	Title	Hours
BME 335	Engineering Probability and Statistics	3
M 358K	Applied Statistics	3
M 378K	Introduction to Mathematical Statistics	3

Other Computing Topics

Code	Title	Hours
C S 324E	Elements of Graphics and Visualization	3
C S 327E	Elements of Databases	3
C S 329E	Advanced Topics in Elements of Computing	3
C S 377	Principles and Applications of Parallel Programming	3
M 346	Applied Linear Algebra	3
M 362M	Introduction to Stochastic Processes	3
M 368K	Numerical Methods for Applications	3
M 372K	Partial Differential Equations and Applications	3
M 376C	Topics in Methods of Applied Mathematics	3
M E 367S	Simulation Modeling	3
M E 374C	Combustion Engine Processes	3
M E 374E	Race Car Engineering and Project Management	3