

Physics, Teaching (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. For those who plan to teach physics in secondary school, the teaching option provides the courses needed for certification.

This concentration is designed to fulfill the course requirements for certification as a middle grades or secondary school science teacher in Texas; the student chooses composite science certification with physics as the primary teaching field, physical sciences certification, physics/mathematics certification, or mathematics, physical science, and engineering certification. However, completion of the course requirements does not guarantee the student's certification. For information about additional requirements, students should consult the UTeach-Natural Sciences academic advisor.

To graduate and be recommended for certification, students who follow the Teaching Option must have a University grade point average of at least 2.50. They must earn a grade of at least C- in the supporting course in requirement 9 and in each of the professional development courses listed in requirement 11 and must pass the final teaching portfolio review; those seeking middle grades certification must also earn a grade of at least C- in each of the courses listed in requirement 12. Information about the portfolio review and additional teacher certification requirements is available from the UTeach-Natural Sciences academic advisor.

Total Hours Required: 120

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](#).

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
<u>First-Year Signature Course (090)</u>		3
<u>American and Texas Government (070)</u>		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
<u>Visual and Performing Arts (050)</u>		3
<u>American and Texas Government (070)</u>		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
<u>Social and Behavioral Sciences (080)</u>		3
<u>Foreign Language other than English, Beginning Proficiency</u>		6
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
<u>Foreign Language other than English, Beginning Proficiency</u>		6
Hours		17
Year 3		
Semester 1		
PHY 353L	Modern Physics Laboratory	3
PHY 336K	Classical Dynamics	3
Hours chosen from: Upper-division Math		3
Hours chosen from: AST, BIO, or GEO		3
<u>U.S. History (060)</u>		3
Hours		15
Semester 2		
PHY 373	Quantum Physics I: Foundations	3
PHY 352K	Classical Electrodynamics I	3
Hours chosen from: Upper-division Math		3
Hours chosen from: AST, BIO, or GEO		3
Hours		12
Year 4		
Semester 1		
PHY 369	Thermodynamics and Statistical Mechanics	3
PHY 362K	Quantum Physics II: Atoms and Molecules	3
<u>Humanities (040)</u>		3
Free Elective		3
Hours		12
Semester 2		
Hours chosen from:		3
PHY 362L	Quantum Physics III: Particles and Nuclei	
PHY 352L	Classical Electrodynamics II	
PHY 375R	Introduction to Relativity	
PHY 375S	Introductory Solid-State Physics	
PHY 474	Advanced Laboratory I	4
Free Elective		4
<u>U.S. History (060)</u>		3
Hours		14
Total Hours		120

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		
PHY 341.7	Research Methods: UTeach (Topic 7: Research Methods: UTeach) ¹	3
PHY 353L	Modern Physics Laboratory	3
PHY 355	Modern Physics and Thermodynamics	3
M 408C	Differential and Integral Calculus	4
M 408D	Sequences, Series, and Multivariable Calculus	4
M 427J	Differential Equations with Linear Algebra	4
or M 427K	Advanced Calculus for Applications I	
M 427L	Advanced Calculus for Applications II	4
Hours chosen from:		9
PHY 329	Introduction to Computational Physics	
PHY 333	Modern Optics	
PHY 336K	Classical Dynamics	
PHY 338K	Electronic Techniques	
PHY 352K	Classical Electrodynamics I	
PHY 373	Quantum Physics I: Foundations	
SCI 365	Physics by Inquiry	
HIS 329U	Perspectives on Science and Mathematics	3
or PHL 329U	Perspectives on Science and Mathematics	
Complete one certification area:		12
Composite Science Certification (see Course List Tab for details)		
Physical Sciences Certification (see Course List Tab for details)		
Physics/Mathematics Certification (see Course List Tab for details)		
Mathematics, Physical Science, and Engineering Certification (see Course List Tab for details)		
Hours chosen from:		6
EDC 651S.3	Secondary School Teaching Practicum: Math (Topic 3: Secondary School Teaching Practicum: Math)	
EDC 651S.4	Secondary School Teaching Practicum: Science (Topic 4: Secondary School Teaching Practicum: Science)	
EDC 365C	Knowing and Learning in Math and Science	3
or UTS 350	Knowing and Learning in Math and Science	
EDC 365D	Classroom Interactions	3
or UTS 355	Classroom Interactions	
EDC 365E	Project-Based Instruction	3
or UTS 360	Project-Based Instruction	
UTS 101	Secondary Teacher Education Preparation: Step 1	1
UTS 110	Secondary Teacher Education Preparation: STEP 2	1
UTS 170	Student Teaching Seminar	1
<i>Subtotal</i>		67
Major (see details below)		12
Degree (see details below)		6
Free electives: Additional coursework to reach total hours required.		3
<i>Subtotal</i>		27
General Education		
Remaining Core Curriculum (42 hours total)		32
Foreign Language other than English, Beginning Proficiency		
<i>Subtotal</i>		32
College Requirements - Natural Sciences		

General University Requirements	
Total Hours	120

Additional Requirements and Policies

With the consent of the UTeach-Natural Sciences undergraduate advisor, an upper-division physics course that includes a substantial research component may be substituted for PHY 341

Students seeking middle grades certification must complete the following courses:

Code	Title	Hours
EDC 339E	Secondary School Literacy across the Disciplines	3
Total Hours		3

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
Foreign Language other than English, Beginning Proficiency		
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.

Composite Science Certification

Code	Title	Hours
BIO 311C	Introductory Biology I	3
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:		3

GEO 401	Physical Geology	
GEO 303	Introduction to Geology	
GEO 302C	Climate: Past, Present, and Future	
GEO 302E	Earth, Wind, and Fire	
GEO 302G	Earth Science and Sustainability	
GEO 302M	The Age of Mammals	
GEO 302N	Geology of National Parks	
GEO 303E	Earth in 2100	
GEO 302J	Crisis of Our Planet	
GEO 302T	Climate and the Energy Transition	
Total Hours		12

Physical Sciences Certification

Code	Title	Hours
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:		6
CH X04	Introduction to Chemical Practice	
or CH X17	Descriptive Inorganic Chemistry	
CH 353	Physical Chemistry I	
CH 153K	Physical Chemistry Laboratory	
CH 154K	Physical Chemistry Laboratory	
CH 354L	Physical Chemistry II	
CH 455	Fundamentals of Analytical Chemistry	
or CH 456	Analytical Chemistry	
Total Hours		12

Physics/Mathematics Certification

Code	Title	Hours
M 315C	Foundations, Functions, and Regression Models	3
M 333L	Structure of Modern Geometry	3
Total Hours		6

Mathematics, Physical Science, and Engineering Certification

Code	Title	Hours
M 315C	Foundations, Functions, and Regression Models	3
M 325K	Discrete Mathematics	3
M 333L	Structure of Modern Geometry	3
M 358K	Applied Statistics	3
M 362K	Probability I	3
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	
CH 204	Introduction to Chemical Practice	2
E S 301	Engineering Design and Problem Solving	3
M E 377K	Projects in Mechanical Engineering (upon approval of the project by the UTeach Program)	3
Total Hours		29