

PHYSICS (BA OR BS)

Physics, a fundamental and quantitative science, involves the study of matter and energy, and interactions between them. The subject is generally divided into mechanics, electricity and magnetism, statistical and thermal physics, and quantum physics. These form the foundation for present-day research areas, which include astrophysics, atomic, molecular and optical physics, condensed matter physics, nuclear physics, and the physics of particles and fields. In addition to a knowledge of physics, students gain a rigorous training in logical thinking and quantitative problem solving. An education in physics can also provide an entry into many other fields such as biophysics, geophysics, medical physics, and engineering, as well as into less technical fields such as secondary education, technical sales, and science writing. Many students have also found that physics is an excellent preparation for the study of medicine, dentistry, or law.

The preferred introductory sequence for a major in physics, common to all physics degree programs, consists of PHYS 1600Q Introduction to Modern Physics, PHYS 1601Q Fundamentals of Physics I, and PHYS 1602Q Fundamentals of Physics II. There are two options for the Bachelor of Science degree in physics:

1. the general option for students seeking to further their physics studies in graduate school and/or a career in research, and
2. the applied option, for students seeking graduate study in another field, medicine or dentistry, or a technical career in industry.

The Bachelor of Arts degree in physics is ideal for pre-medical, pre-dental, or pre-veterinary students, students seeking double majors, or students seeking a middle or high school teaching career. There is also a Bachelor of Science in Engineering Physics offered jointly with the College of Engineering with possible emphases on Electrical Engineering, Mechanical Engineering, or Materials Science and Engineering. There is also a Bachelor of Science in Mathematics-Physics that is offered jointly with the Department of Mathematics.

Students satisfy the information literacy competency exit requirements in both the Physics B.S. and B.A. degrees by passing PHYS 2300 The Development of Quantum Physics and PHYS 2501W Advanced Undergraduate Laboratory. The University's writing in the major requirement is achieved by passing PHYS 2501W Advanced Undergraduate Laboratory. PHYS 4096W Research Thesis in Physics may be taken as well.

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Physics - General Option (BS)

Required physics courses must include:

Course	Title	Credits
PHYS 2300	The Development of Quantum Physics	3
PHYS 2501W	Advanced Undergraduate Laboratory	4
PHYS 3101	Mechanics I	3
PHYS 3201	Electricity and Magnetism I	3

PHYS 3202	Electricity and Magnetism II	3
PHYS 3300	Statistical and Thermal Physics	3
PHYS 3401	Quantum Mechanics I	3
Select at least three credits of advanced laboratory from the following:		3
PHYS 3150	Electronics	
PHYS 3501	Modern Experimental Methods	
PHYS 4150	Optics	
2000 level or above PHYS electives		12
Total Credits		37

It is strongly recommended that students going on to graduate school in physics take PHYS 3402 Quantum Mechanics II. All students are strongly encouraged to participate in an undergraduate research project. An experimental research project (PHYS 3989 Undergraduate Research or PHYS 4096W Research Thesis in Physics) may count towards the advanced laboratory requirement. No more than six credits from PHYS 4099 Independent Study may be counted towards this degree option. The general option for the Bachelor of Science degree requires a minimum of 12 credits from 2000-level or above related courses in mathematics, other sciences, or engineering.

Physics - Applied Option (BS)

Required physics courses must include:

Course	Title	Credits
PHYS 2300	The Development of Quantum Physics	3
PHYS 2501W	Advanced Undergraduate Laboratory	4
PHYS 3101	Mechanics I	3
PHYS 3201	Electricity and Magnetism I	3
PHYS 3300	Statistical and Thermal Physics	3
Select a minimum of nine credits from the following courses: ¹		9
PHYS 3150	Electronics	
PHYS 3501	Modern Experimental Methods	
PHYS 4140	Principles of Lasers	
PHYS 4150	Optics	
PHYS 4210	Introduction to Solid State Physics	
PHYS 4350	Nuclei and Particles	
PHYS 4710	Stars and Compact Objects	
or PHYS 4720	Galaxies and the Interstellar Medium	
Total Credits		25

¹ At least three of the nine credits being from an advanced laboratory (PHYS 3501 Modern Experimental Methods, PHYS 3150 Electronics, or PHYS 4150 Optics).

These courses involve the application of the basic physics subjects; i.e. mechanics, electricity and magnetism, thermodynamics, and quantum mechanics, in the introduction to the major subfields of physics. All students are strongly encouraged to participate in an undergraduate research project. An experimental research project (PHYS 3989 Undergraduate Research or PHYS 4096W Research Thesis in Physics) may count towards the advanced laboratory requirement.

The applied option for the Bachelor of Science degree requires six credits of 2000-level or above PHYS electives, plus a minimum of 12 credits from 2000-level or above related courses in mathematics, other sciences, or

engineering, and an additional six credits of either 2000-level or above PHYS electives or 2000-level or above related courses in mathematics, other sciences, or engineering.

Physics (BA)

Required physics courses must include:

Course	Title	Credits
PHYS 2300	The Development of Quantum Physics	3
PHYS 2501W	Advanced Undergraduate Laboratory	4
PHYS 3101	Mechanics I	3
PHYS 3201	Electricity and Magnetism I	3
PHYS 3300	Statistical and Thermal Physics	3
Nine credits of 2000 level or above PHYS electives		9
Total Credits		25

No more than six credits from PHYS 4099 Independent Study may be counted towards this degree. The Bachelor of Arts degree requires a minimum of 12 credits from 2000-level or above related courses in mathematics, other sciences, or engineering.

Mathematics-Physics (BS)

The B.S. degree in Mathematics-Physics may be completed by following either track A, which has a physics emphasis, or track B, which has a mathematics emphasis. Students in track A should choose an advisor from the Physics Department, and those in Track B should choose an advisor from the Mathematics Department. The number of credits for 2000-level courses or above in the Track A is 30 in Physics and 19 in Mathematics, and for Track B these numbers are 21 credits in Physics and 28 in Mathematics.

In either track, the writing in the major and information literacy competencies are met using PHYS 2501W Advanced Undergraduate Laboratory.

Mathematics-Physics Major Track A (Physics Emphasis)

Course	Title	Credits
Complete the courses from one of the following groups:		10-16

Group 1

MATH 2110Q	Multivariable Calculus or MATH 2130Q or MATH 2143Q Advanced Calculus III	
MATH 2210Q	Applied Linear Algebra	
MATH 2410Q	Elementary Differential Equations or MATH 2420Q	

Group 2

MATH 2141Q	Advanced Calculus I	
MATH 2142Q	Advanced Calculus II	
MATH 2143Q	Advanced Calculus III	
MATH 2144Q	Advanced Calculus IV	

Additional Required Courses

MATH 3146	Introduction to Complex Variables	3
MATH 3410	Differential Equations for Applications	3
MATH 3510	Numerical Analysis I	3
PHYS 2300	The Development of Quantum Physics	3
PHYS 2501W	Advanced Undergraduate Laboratory	4

PHYS 3101	Mechanics I	3
PHYS 3201	Electricity and Magnetism I	3
PHYS 3202	Electricity and Magnetism II	3
PHYS 3300	Statistical and Thermal Physics	3
PHYS 3401	Quantum Mechanics I	3
Select nine credits of 2000-level or above PHYS electives.		9

Total Credits **50-56**

Mathematics-Physics Major Track B (Mathematics Emphasis)

Course	Title	Credits
Required Courses		

Complete the courses from one of the following groups: 16-21

Group 1

MATH 2110Q	Multivariable Calculus or MATH 2130Q or MATH 2143Q Advanced Calculus III	
MATH 2210Q	Applied Linear Algebra	
MATH 2410Q	Elementary Differential Equations or MATH 2420Q	
MATH 2710	Transition to Advanced Mathematics or MATH 2141Q Advanced Calculus I and Advanced Calculus II & MATH 2142Q	
MATH 3146	Introduction to Complex Variables	

Group 2

MATH 2141Q	Advanced Calculus I	
MATH 2142Q	Advanced Calculus II	
MATH 2143Q	Advanced Calculus III	
MATH 2144Q	Advanced Calculus IV	
MATH 3146	Introduction to Complex Variables	

Additional Required Courses

PHYS 2300	The Development of Quantum Physics	3
PHYS 2501W	Advanced Undergraduate Laboratory	4
PHYS 3101	Mechanics I	3
PHYS 3201	Electricity and Magnetism I	3
PHYS 3202	Electricity and Magnetism II	3
PHYS 3401	Quantum Mechanics I	3
Select three credits from the following:		3

PHYS 2200	Computational Physics	
PHYS 2400	Mathematical Methods for the Physical Sciences	
PHYS 3102	Mechanics II	
PHYS 3150	Electronics	
PHYS 3300	Statistical and Thermal Physics	
PHYS 3501	Modern Experimental Methods	
PHYS 3989	Undergraduate Research	
PHYS 4093	Foreign Study	
PHYS 4095	Special Topics	
PHYS 4096W	Research Thesis in Physics	
PHYS 4098	Variable Topics	
PHYS 4099	Independent Study	
PHYS 4100	Physics of the Earth's Interior	

PHYS 4130	Fundamentals of Planetary Science	
PHYS 4140	Principles of Lasers	
PHYS 4150	Optics	
PHYS 4210	Introduction to Solid State Physics	
PHYS 4350	Nuclei and Particles	
PHYS 4710	Stars and Compact Objects	
PHYS 4720	Galaxies and the Interstellar Medium	
PHYS 4730	General Relativity and Cosmology	
PHYS 4740	Advanced Methods in Astrophysics	
PHYS 4900		
Select four of the following:		12
MATH 3150	Analysis I	
or MATH 4110	Introduction to Modern Analysis	
MATH 3151	Analysis II	
MATH 3160	Probability	
MATH 3210	Abstract Linear Algebra	
MATH 3230	Abstract Algebra I	
or MATH 4210	Advanced Abstract Algebra	
MATH 3330	Elements of Topology	
or MATH 4310	Introduction to Geometry and Topology	
MATH 3370	Differential Geometry	
MATH 3410	Differential Equations for Applications	
Total Credits		50-55

Engineering Physics (BS or BSE)

Offered jointly by the Physics Department of the College of Liberal Arts and Sciences and the College of Engineering.

Students choose the college/school that they wish to graduate from and must satisfy the course requirements of either the College of Liberal Arts and Sciences or the College of Engineering to complete their degree. Students in the College of Liberal Arts and Sciences will earn a Bachelor of Science degree, and Students in the College of Engineering will earn a Bachelor of Science in Engineering degree.

Requirements

Course	Title	Credits
Physics Requirements		
PHYS 2300	The Development of Quantum Physics	3
PHYS 3101	Mechanics I	3
PHYS 3201	Electricity and Magnetism I	3
PHYS 3202	Electricity and Magnetism II	3
PHYS 2501W	Advanced Undergraduate Laboratory	4
PHYS 3401	Quantum Mechanics I	3
PHYS 3300	Statistical and Thermal Physics	3
Six credits of PHYS 2000 level or above electives		6
Engineering Requirements		
CSE 1010	Introduction to Computing for Engineers	3
ENGR 1000	Orientation to Engineering	1
ENGR 1166	Foundations of Engineering	3
ENGR 4001	Multidisciplinary Engineering Design I	3
ENGR 4002W	Multidisciplinary Engineering Design II	3
MSE 2001	Introduction to Structure, Properties, and Processing of Materials I	3

or MSE 2101	Materials Science and Engineering I	
MSE 2002	Introduction to Structure, Properties, and Processing of Materials II	3
or MSE 2102	Materials Science and Engineering II	
CE 2110	Applied Mechanics I	3
CE 3110	Mechanics of Materials	3
CE 3120	Fluid Mechanics	4
CHEG 2103	Introduction to Chemical Engineering	3
ECE 2001	Electrical Circuits	4
Select one Thermal Science Elective from the following:		3-4
MSE 3001	Applied Thermodynamics of Materials	
ME 2233	Thermodynamic Principles	
CHEG 2111	Chemical Engineering Thermodynamics I	
Nine credits ENGR electives (three credits may be 2000-level, at least six credit must be 3000-level)		9
Additional Requirements		
MATH 2110Q	Multivariable Calculus	7
& MATH 2410Q	and Elementary Differential Equations	
STAT 3025Q	Statistical Methods	3
Total Credits		86-87

University General Education Requirements

Every student must meet a set of core requirements to earn a baccalaureate degree, in addition to those required by the student's major course of study and other requirements set by the student's school or college. For more information about these requirements, please see General Education Requirements (<https://catalog.uconn.edu/undergraduate/gen-ed-requirements/>).

College of Liberal Arts and Sciences Degree Requirements

Students must meet a set of requirements established by the college in addition to the University's General Education requirements. For more information, see the College of Liberal Arts and Sciences (<https://catalog.uconn.edu/undergraduate/liberal-arts-sciences/#requirementstext>) section of this catalog.