UNIVERSITY of VIRGINIA
DEPARTMENT of PHYSICS

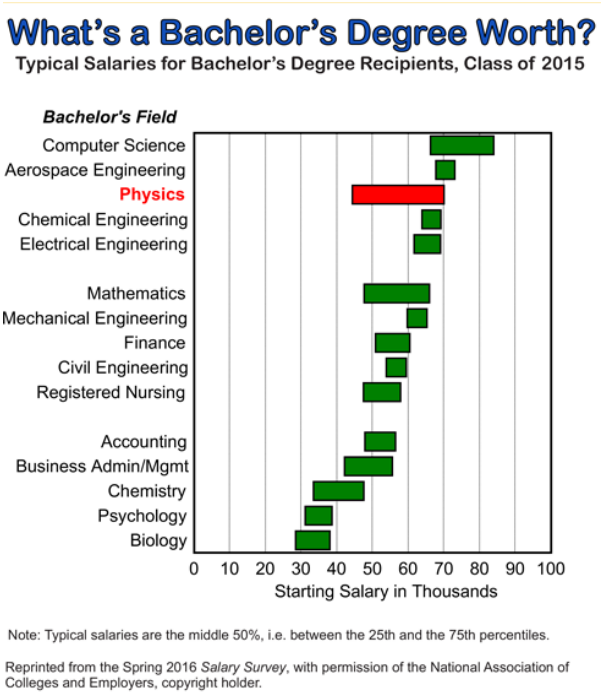
Undergraduate Physics Degree Programs (2025-26)

There is no better way to understand the natural world than to study physics. Physicists research the basic principles underlying all scientific phenomena and use those principles to develop applications that advance human civilization. They examine the nature of space, time, matter and energy by studying the smallest particles and the largest cosmological structures. Their discoveries are used in areas ranging from electronics to molecular biology, and from power generation to climate science. UVA physics majors learn the fundamental theories supporting modern physics, develop advanced problem-solving skills, and assist our faculty's innovative research.

Physics majors at UVa are an outstanding, enthusiastic and diverse group. Typically, about fifty students graduate each year with bachelor's degrees in Physics. These students have a wide range of interests, and many have double majors. Recent second majors include anthropology, biology, chemistry, economics, English, environmental science, French, German, government, history, mathematics, music, philosophy, psychology, religious studies, Slavic, and studio art, along with all fields of engineering.

Approximately half of our BS Physics and BS Astronomy/Physics majors enter the work force after graduation, where their employment opportunities are excellent. Large companies where our graduates have recently started include KPMG, Epic, NOVA, Exxon Mobile, General Dynamics, GE Lighting, Rolls Royce, McKinsey, and Booz Allen Hamilton. Entry-level salaries for physics majors are similar to those in other technical fields, as illustrated in the graph below. Copious information about careers in physics is available from the American Physical Society, the American Institute for Physics, and the national Society for Physics Students.

The other half of our majors go on to graduate or professional schools, many at top-ranked universities where they are very successful. Recent graduates have attended UC Berkeley, UC Santa Barbara, Cal Tech, Chicago, Cornell, Princeton, Duke, Georgia Tech, Harvard, Toronto, Johns Hopkins, Michigan, MIT, Stanford, and Yale. While the majority of these students continue their physics studies, others go on to professional schools in medicine, education, business and law.



All together, physics offers an unparalleled combination of intellectual satisfaction and career prospects. If this sounds appealing, get in contact with a physics advisor and let us tell you more about it!

If you are curious about how a physics degree may fit your interests, please contact one of the physics undergraduate advisers listed below to learn about the various possibilities and to design a program to fit your specific needs. No prerequisite classes have to be taken before a Physics Major or Minor is declared.

Undergraduate Advisors	**Office**	**Office Phone**	**Email Address**
Gai-Wei Chern	Physics 310C	924-4276	gc6u@virginia.edu
Craig Group	HEP 113	243-5552	rcg6p@virginia.edu
Bob Hirosky	HEP 101	982-5721	rjh2j@virginia.edu
Kent Paschke	Physics 163	924-4543	paschke@virginia.edu
Olivier Pfister	Physics 309	924-7956	op6n@virginia.edu
Jency Sundararajan	Physics 022B	243-8016	zey9gt@virginia.edu
Jongsoo Yoon	Physics 063	982-2197	jy2b@virginia.edu
Cass Sackett	Physics 311	924-6795	cas8m@virginia.edu

Requirements: Bachelor of Arts (BA) in Physics

The Physics BA degree is designed for students interested in physics but planning to enter professional schools in business, education, law, and medicine, and for liberal arts students desiring a strong background in physical science but with career objectives in other areas. It is a highly flexible program that you can customize to support your specific interests, wherever they may lie. Official information regarding the major requirements is available in the Undergraduate Record.

While it is not required, we recommend that prospective physics majors take PHYS 1930 (Physics in the 21st Century), which introduces many of the 'big ideas' in physics, provides an overview of potential career paths, and helps connect students with research opportunities in the department.

Students must complete the following courses [34 credits]:

- PHYS 1420 or PHYS 1425 - Introductory Physics 1
- PHYS 1429 - Physics 1 Workshop
- MATH 2310 or APMA 2120 - Multivariable Calculus
- PHYS 2410 or PHYS 2415 - Introductory Physics 2
- PHYS 2419 - Physics 2 Workshop
- PHYS 2620 - Modern Physics
- MATH 3250 or APMA 2130 - Differential Equations
- PHYS 2720 - Problem Solving
- Four additional 3000-level physics courses

A sample course schedule is shown on page 9.

The classification of the courses into prerequisites and requirements, and into components, reflects the order in which classes are taken. Physics courses are more sequential than courses in some other majors. Each course descriptions in SIS may list other courses that are expected to be taken earlier (pre-requisites), or concurrently (co-requisites).

Students can substitute PHYS 2415 and PHYS 2419 with ECE 2200 (Applied Physics) or ECE 3209 (Electromagnetic Fields).

Required courses must be passed with a minimum grade of C, and a major grade point average of at least 2.000 must be achieved. (For students declaring the major prior to Fall 2024, the minimum acceptable grade is C-.) The School imposes other requirements for graduation; e.g. students in the College of Arts and Sciences need to earn a certain number of credits, and, if not Echols scholars, have to fulfill General Education requirements.

REQUIREMENTS: BACHELOR OF SCIENCE (BS) IN PHYSICS

The Physics BS degree is designed for students who are planning graduate study in physics or physics-related areas, or who are planning careers in a scientific or technical field. The program provides intensive preparation in physics and lays a solid foundation for a lifetime of discovery. Official information regarding the major requirements is available in the Undergraduate Record.

The BS degree requires a concentration in either Fundamental Physics or Applied Physics. The Fundamental Physics concentration is designed for students who seek to pursue a career as a researcher. It provides the most rigorous foundation in basic physics principles and is excellent preparation for continuing work towards a Physics Ph.D. The Applied Physics concentration is designed for students who seek to apply their understanding of physics to practical problems in technology and other sciences. It features customizable elective and capstone coursework.

While it is not required, we recommend that prospective physics majors take PHYS 1930 (Physics in the 21st Century), which introduces many of the 'big ideas' in physics, provides an overview of potential career paths, and helps connect students with research opportunities in the department.

Core Requirements

Students in either concentration must complete the following courses [35 credits]:

PHYS 1420 *or* PHYS 1425 - Introductory Physics 1
PHYS 1429 - Physics 1 Workshop
PHYS 1655 - Python for Scientists and Engineers *or* PHYS 3630 - Computational Physics
MATH 2310 *or* APMA 2120 - Multivariable Calculus
PHYS 2410 *or* PHYS 2415 - Introductory Physics 2
PHYS 2419 - Physics 2 Workshop
PHYS 2620 - Modern Physics
MATH 3250 *or* APMA 2130 - Differential Equations
PHYS 2720 - Problem Solving
PHYS 3140 - Intermediate Lab
PHYS 3340 - Mathematics for Physics
MATH 4220 *or* APMA 3140 - Partial Differential Equations

Fundamental Physics

Students in the Fundamental Physics concentration must complete the following additional courses [27 credits]:

PHYS 3170 *or* PHYS 3180 - Advanced Lab
PHYS 3210 - Classical Mechanics
PHYS 3310 - Statistical Physics
PHYS 3420 - Electricity and Magnetism 1
PHYS 3430 - Electricity and Magnetism 2
PHYS 3650 - Quantum Mechanics 1
PHYS 3660 - Quantum Mechanics 2
PHYS 3995 - Research
One additional 3000- or 5000-level physics elective

Applied Physics
Students in the Applied Physics concentration must complete the following three requirements [27 credits]:

1. *Advanced Physics*: Three courses chosen from PHYS 3210, PHYS 3310, PHYS 3420, PHYS 3430, PHYS 3650, and PHYS 3660.
2. *Topical Electives*: Twelve credits addressing a cohesive physics-related topic in science or engineering, on which the student intends to focus their capstone. Three credits can be at the 2000-level or higher, and the other nine must be at the 3000-level or higher. A list of potential topics and corresponding courses is available on the department web site.
3. *Capstone*: Six credits of research or project work on the student's chosen topic. These credits can be from any department, but projects outside of the physics department require approval by the student's major advisor.

Example schedules for the degree are shown on page 10-11

Required courses must be passed with a minimum grade of C, and a major grade point average of at least 2.000 must be achieved. (For students declaring the major prior to Fall 2024, the minimum acceptable grade is C-.) The School imposes other requirements for graduation; e.g. students in the College of Arts and Sciences need to earn a certain number of credits, and, if not Echols scholars, have to fulfill General Education requirements.

Distinguished Major Program - This program provides recognition of outstanding academic performance in a challenging sequence of Physics courses including a research project. Students who complete the BS requirements with final grade point averages exceeding 3.4, 3.6, or 3.8, are given departmental recommendation to receive their degrees with distinction, high distinction, or highest distinction, respectively.

REQUIREMENTS: BACHELOR OF SCIENCE IN ASTRONOMY/PHYSICS

The Astronomy/Physics BS is an interdepartmental major administered jointly with the Astronomy Department. The program prepares a student for graduate study in either astronomy or physics, or in related fields. Students in this major have advisors both from Astronomy and Physics. Official information regarding the major requirements is available in the Undergraduate Record.

While it is not required, we recommend that prospective majors take ASTR 1610 (Introduction to Astronomy Research), which introduces many of the 'big ideas' in astronomy and helps connect students with research opportunities in the department.

Students must complete the following courses [73 credits]:

MATH 1310 - Calculus 1
MATH 1320 - Calculus 2
PHYS 1420 *or* PHYS 1425 - Introductory Physics 1
PHYS 1429 - Physics 1 Workshop
PHYS 1655 Python for Scientists and Engineers *or* PHYS 3630 - Computational Physics
MATH 2310 *or* APMA 2120 - Multivariable Calculus
PHYS 2410 *or* PHYS 2415 - Introductory Physics 2
PHYS 2419 - Physics 2 Workshop
PHYS 2620 - Modern Physics
ASTR 2110 - Introduction to Astrophysics 1
ASTR 2120 - Introduction to Astrophysics 2
MATH 3250 *or* APMA 2130 - Differential Equations
PHYS 2720 - Problem Solving
ASTR 3130 - Observational Astronomy
PHYS 3210 - Classical Mechanics
PHYS 3310 - Statistical Physics
PHYS 3340 - Mathematics for Physics
MATH 4220 *or* APMA 3140 - Partial Differential Equations
PHYS 3420 - Electricity and Magnetism 1
PHYS 3430 - Electricity and Magnetism 2
PHYS 3650 - Quantum Mechanics 1
ASTR 4988 - Senior Thesis
Six additional credits of 3000- to 5000-level astronomy electives

An example schedule for the degree is shown on page 12

Distinguished Astronomy-Physics Major Program - Students must maintain a GPA of 3.400 or better. For the Distinguished Majors Program (DMP), students must meet the requirements of the astronomy-physics major described above, must complete either PHYS 3660 or any PHYS course at the 5000-level, complete a two-semester Senior Thesis (ASTR 4998), and complete at least two ASTR courses at the 4000 or 5000-level (excluding ASTR 4993 and 4998) as part of the six credits of elective astronomy courses. This program leads to the award of degrees with distinction, high distinction, or highest distinction.

REQUIREMENTS: MINOR IN PHYSICS

In addition to a major subject, students may choose a minor in a second subject. The physics minor is an excellent option for students whose primary interests lie elsewhere, but who enjoy physics and want to develop their proficiency with it. Official information regarding the minor requirements is available in the Undergraduate Record.

There are two options leading to a Physics Minor:

Option I [21 credits]

PHYS 1420 or PHYS 1425 - Introductory Physics 1
PHYS 1429 - Physics 1 Workshop
MATH 2310 or APMA 2120 - Multivariable Calculus
PHYS 2410 or PHYS 2415 - Introductory Physics 2
PHYS 2419 - Physics 2 Workshop
PHYS 2620 - Modern Physics
PHYS 2720 - Problem Solving
One additional 3000-level physics elective

Option II [21 credits]

PHYS 2010 - Principles of Physics 1
PHYS 2020 - Principles of Physics 2
PHYS 2030 - Principles of Physics 1 Workshop
PHYS 2040 - Principles of Physics 2 Workshop
MATH 2310 or APMA 2120 - Multivariable Calculus
PHYS 2620* - Modern Physics
PHYS 2720 - Problem Solving
One additional 3000-level physics elective

*Option II is intended for exceptional students only. Modern Physics, and most electives, require calculus-based physics, and mathematics preparation as it is taught in MATH 2310 (Multivariable Calculus). It is strongly recommended to see a physics major advisor, or the course instructor, before taking Modern Physics.

Required courses must be passed with a minimum grade of C, and a major grade point average of at least 2.000 must be achieved. (For students declaring the major prior to Fall 2024, the minimum acceptable grade is C-.)

The college does not allow for double counting of courses between minor and major(s) for college students. A physics advisor can grant exceptions to this if the course which is to be double counted is an introductory physics course that is a required component in the major.

TYPICAL COURSE SEQUENCES

Example Course Sequence for BA Physics

Shown is a typical schedule for a student who intends to major with a BA in physics. The course sequence shown covers only the courses that are relevant for the major. A Physics BA can easily be started in the second year.

Fall			Spring		
		First Year			
MATH 1310	Calculus I	[4]	MATH 1320	Calculus II	[4]
PHYS 1930	Phys. 21st century*	[2]	PHYS 1420	Intro. Physics 1	[3]
PHYS 1660	Practical Computing*	[1]	PHYS 1420	Intro. Phys. 1 Workshop	[1]
		Second Year			
MATH 2310	Calculus III	[4]	MATH 3250	Differential Eqn.	[4]
PHYS 2410	Intro. Physics 2	[3]	PHYS 2620	Modern Physics	[4]
PHYS 2419	Intro. Phys. 2 Workshop	[1]	PHYS 2720	Problem solving	[2]
		Third Year			
PHYS 3150	Electronics Lab	[3]	PHYS 3040	Physics of the Human Body	[4]
		Fourth Year			
PHYS 3110	Widely Applied Physics	[3]	PHYS 3120	Applied Physics: Energy	[3]

* These courses are not required

Example Course Sequence for BS Fundamental Physics

The schedule shown here assumes no AP credit or summer classes, and it is suitable for a student who does not need to prepare for the Physics GRE in fall of the fourth year. The course sequence shown covers only the courses that are relevant for the major.

Fall			Spring		
First Year					
MATH 1310	Calculus I	[4]	MATH 1320	Calculus II	[4]
PHYS 1930	Phys. 21st century*	[2]	PHYS 1420	Intro. Physics 1	[3]
PHYS 1660	Practical Computing*	[1]	PHYS 1420	Intro. Phys. 1 Workshop	[1]
Second Year					
MATH 2310	Calculus III	[4]	MATH 3250	Differential Eqn.	[4]
PHYS 2410	Intro. Physics 2	[3]	PHYS 2620	Modern Physics	[4]
PHYS 2419	Intro. Phys. 2 Workshop	[1]	PHYS 2720	Problem solving	[2]
PHYS 1655	Python	[3]			
Third Year					
MATH 4220	Part. Diff. Eq.	[3]	MATH 4210	Mathematics for Physics	[3]
PHYS 3210	Class. Mech.	[3]	PHYS 3420	Electricity & Magn. I	[3]
PHYS 3310	Statistical Physics	[3]	PHYS 3140	Intermediate Lab	[4]
Fourth Year					
PHYS 3430	Electricity & Magn. II	[3]	PHYS 3660	Quantum Physics II	[3]
PHYS 3650	Quantum Physics I	[3]	PHYS 3180	Advanced Lab B	[3]
PHYS 3995	Research	[3]	PHYS 3xxx	Elective	[3]

* These courses are not required.

Example Course Sequence for BS Applied Physics

The schedule shown here assumes no AP credit or summer classes, and it illustrates a student focusing on material science. The course sequence shown covers only the courses that are relevant for the major.

Fall			Spring		
		First Year			
MATH 1310	Calculus I	[4]	MATH 1320	Calculus II	[4]
PHYS 1930	Phys. 21st century*	[2]	PHYS 1420	Intro. Physics 1	[3]
PHYS 1660	Practical Computing*	[1]	PHYS 1420	Intro. Phys. 1 Workshop	[1]
		Second Year			
MATH 2310	Calculus III	[4]	MATH 3250	Differential Eqn.	[4]
PHYS 2410	Intro. Physics 2	[3]	PHYS 2620	Modern Physics	[4]
PHYS 2419	Intro. Phys. 2 Workshop	[1]	PHYS 2720	Problem solving	[2]
PHYS 1655	Python	[3]	MSE 2090	Intro Materials Science	[3]
		Third Year			
MATH 4220	Part. Diff. Eq.	[3]	PHYS 3140	Intermediate Lab	[4]
PHYS 3310	Statistical Physics	[3]	PHYS 3340	Math for Physics	[3]
MSE 3670	Material Properties	[3]	MSE 3101	Materials Science Lab	[3]
		Fourth Year			
PHYS 3650	Quantum 1	[3]	PHYS 3620	Condensed Matter Physics	[3]
PHYS 3995	Research	[3]	PHYS 3660	Quantum 2	[3]
			PHYS 3995	Research	[3]

* These courses are not required.

Example Course Sequence for BS Astronomy/Physics

This schedule is for students who intend to major with a BS in Astronomy / Physics. The course sequence shown covers only the courses that are relevant for the major. Students in the Distinguished Astronomy-Physics Major Program are required to take more courses, mostly in their fourth year.

This schedule assumes one semester of calculus experience from high school, either via dual enrollment or AP Calculus AB. The major is still readily accessible to students with no calculus background; consult with an advisor about developing a schedule suitable to your situation.

Fall			Spring		
First Year					
MATH 1320	Calculus II	[4]	MATH 2310	Calculus III	[4]
PHYS 1660	Practical Computing*	[1]	PHYS 1420	Intro. Physics 1	[3]
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Second Year					
ASTR 2110	Intro Astrophys. I	[3]	ASTR 2120	Intro Astrophys. II	[3]
MATH 3250	Differential Equations	[4]	PHYS 2620	Modern Physics	[4]
PHYS 2410	Intro. Physics 2	[3]	PHYS 2720	Problem solving	[2]
PHYS 2419	Intro. Phys. 2 Workshop	[1]	PHYS 3340	Math for Physics	[3]
PHYS 1655	Python	[3]	----------		
Third Year					
MATH 4220	Part. Diff. Eq.	[3]	PHYS 3420	Electricity & Magn. I	[3]
PHYS 3210	Class. Mech.	[3]	ASTR 3130	Observational Lab	[3]
PHYS 3650	Quantum Physics I	[3]	ASTR 3/4xxx	Astronomy elective	[3]
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Fourth Year					
PHYS 3430	Electricity & Magn. II	[3]	ASTR 3/4xxx	Astronomy elective	[3]
PHYS 3310	Statistical Physics	[3]	ASTR 4998	Thesis	[3]
ASTR 4810	Astrophysics*	[3]	----------		
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* These courses are not required.