

PHYSICS MAJOR

Program Director: Carter Hall, Ph.D.

Physics is an exciting and rewarding field of study. Physicists make important discoveries that often change the way we live by examining the way things work, and there are still many discoveries to be made.

At Maryland, physics majors benefit from small class-sizes, outstanding teachers and very talented classmates. However, we believe that the most important physics education occurs outside the classroom, and we encourage all of our majors to participate in cutting-edge research with our internationally recognized faculty. Through participation in research projects, our students learn what it takes to conduct world-class scientific research. Whether students decide to continue to study physics in graduate school or work in fields such as engineering, software development, law, business or education, a bachelor's degree in physics from Maryland provides an excellent foundation.

Program Learning Outcomes

Students are expected to fully engage with the curriculum and the opportunities presented for learning and research. Having completed the degree program, students should have acquired the following knowledge and skills:

1. A thorough knowledge of the core areas of physics, including mechanics, electricity and magnetism, thermal physics, and quantum mechanics at a level compatible with admission to graduate programs in physics at peer institutions.
2. The ability to analyze and interpret quantitative results, both in the core areas of physics and in complex problems that cross multiple core areas.
3. An ability to assess and solve unfamiliar problems in physics using the knowledge and skills acquired.
4. The ability to use contemporary experimental apparatus common to the study of physical phenomena, and have the ability to acquire, analyze and interpret scientific data.
5. The ability to communicate scientific results effectively, both verbally and in writing.

REQUIREMENTS

Course	Title	Credits
Lower-level Courses		
PHYS165	Introduction to Programming in the Physical Sciences ¹	3
PHYS171	Introductory Physics: Mechanics	3
PHYS272	Introductory Physics: Fields	3
PHYS273	Introductory Physics: Waves	3
PHYS274	Mathematical Methods for Physics I	3
PHYS275	Experimental Physics I: Mechanics and Heat	2
PHYS276	Experimental Physics II: Electricity and Magnetism	2
MATH140	Calculus I	4
MATH141	Calculus II	4
MATH241	Calculus III	4
Total Credits		31

Upper Level Courses

Complete either the Professional Physics (p. 1) OR Education Physics (p. 1) Concentration

Upper-level courses for Professional Physics area of concentration:

Course	Title	Credits
PHYS371	Modern Physics	3
PHYS373	Mathematical Methods for Physics II	3
PHYS375	Experimental Physics III: Electromagnetic Waves, Optics and Modern Physics	3
PHYS401	Quantum Physics I	4
PHYS402	Quantum Physics II	4
PHYS404	Introduction to Statistical Thermodynamics	3
PHYS405	Advanced Experiments ²	3
PHYS410	Classical Mechanics	4
PHYS411	Intermediate Electricity and Magnetism	4
PHYS4XX	Advanced Physics Elective ³	3
PHYS4XY	Advanced Physics Elective ³	3
Total Credits		37

Education Physics area of Concentration:

Course	Title	Credits
Introductory Education Courses		
TLPL101	Inquiry Approach to Teaching STEM (Step 1)	1
TLPL102	Inquiry Teaching of STEM in Middle School	2
Upper-level and Supporting Courses		
TLPL401	Student-Centered Curriculum and Instruction	3
TLPL414	Knowing and Learning in Mathematics and Science	3
TLPL415	Perspectives in Science	3
EDHD426	Cognitive and Motivational Literacy Content	3
PHYS371	Modern Physics	3
PHYS373	Mathematical Methods for Physics II	3
PHYS375	Experimental Physics III: Electromagnetic Waves, Optics and Modern Physics	3
PHYS410	Classical Mechanics	4
or PHYS411	Intermediate Electricity and Magnetism	
PHYS4xx	Advanced Physics Elective	3-4
Total Credits		31-32

The Education Physics area of concentration is designed to accommodate students obtaining a teaching certificate through the College of Education. However, completing all the courses in the Education Physics area of concentration does not in itself satisfy all requirements for obtaining a teaching certificate. Students pursuing the Education Physics area of concentration who want to also obtain a teaching certificate in secondary education must first apply and be admitted to the Secondary Education Program in the College of Education and then complete additional courses in that program.

¹ Students with prior programming experience may take an upper-level, computational physics course instead of PHYS165. This advanced course may be used for an Advanced Physics Elective as well. PHYS165 is optional for student pursuing the Education Physics area of concentration

² PHYS405 in the Professional Physics area of concentration may be replaced by the two course sequence: PHYS499A, PHYS407.

³ Students completing a second major from a CMNS or Engineering department may use an upper-level course from that program in place of one of the Advanced Physics Electives.

Other Requirements for the Major

Students must complete all courses required for the major with a grade of "C-" or higher.

FOUR YEAR PLAN

Click here (<https://cmns.umd.edu/undergraduate/advising-academic-planning/academic-planning/four-year-plans/four-year-plans-gened/>) for roadmaps for four-year plans in the College of Computer, Mathematical, and Natural Sciences.

Additional information on developing a four-year academic plan can be found on the following pages:

- <http://4yearplans.umd.edu>
- the Student Academic Success-Degree Completion Policy (<https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising/#success>) section of this catalog