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
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PHYS165 | Introduction to Programming in the Physical Sciences ¹ | 3
PHYS171 | Introductory Physics: Mechanics and Relativity | 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
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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
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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

EDCI488 | (EDCI488P Perspectives in Science) | 3
EDCI488 | (EDCI488M Knowing and Learning) | 3
EDCI488 | (EDCI488P Project Based Instruction) | 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
PHYS411 | Intermediate Electricity and Magnetism | 3-4
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.
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:

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