University of Pittsburgh | Dietrich School

Physics and Quantum Computing Major

www.PhysicsAndAstronomy.Pitt.edu/Undergraduate/Degree-Programs
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The University of Pittsburgh a collaboration between the Department of Physics and Astronomy in the Dietrich School of Arts and Sciences and the Department of Computer Science in the School of Computing and Information. This major is designed with an optional CS or Physics "Focus" add-on of three top-level classed to fill in classes required for entry into the respective graduate programs. Students may expect to pursue research that influences many fields, including biology, mathematics, medicine, chemistry, engineering, and computer science.

Required courses for the Physics major

The physics and Quantum Computing major requires the completion of 73 credits. Eighteen of these are pre-requisite math courses.

Note: While not required, the introductory level honors courses, PHYS 0475, PHYS 0476, and PHYS 0520, are appropriate particularly for students seeking degrees in physics.

Prerequisite Mathematics courses

____ MATH 0220 Analytic Geometry and Calculus 1
____ MATH 0230 Analytic Geometry and Calculus 2
____ MATH 0240 Analytic Geometry and Calculus 3
____ MATH 0280, 1180, or 1185 Linear Algebra
____ MATH 0290 or 1270 Differential Equations

Introductory Physics courses

____ PHYS 0174 Basic Physics, Science and Engineering 1
____ PHYS 0175 Basic Physics, Science and Engineering 2

____ PHYS 0475 Intro to Physics, Science and Engineering 1
____ PHYS 0476 Intro to Physics, Science and Engineering 2

___PHYS 0330 Introduction to Physics, Computer Science, and Quantum Information.
This is a proposed 1 hour seminar course drawing speakers from CS, Physics, and other departments.

Intermediate and advanced Physics courses

____ PHYS 0477 Introduction to Thermodynamics, Relativity, and Quantum Theory
____ PHYS 1331 Mechanics
____ PHYS 1341 Thermodynamics and Statistical Mechanics
____ PHYS 1351 Intermediate Electricity/Magnetism
____ PHYS 1370 Quantum Mechanics

Introductory and Intermediate Computer Science

____ CMPINF 0401 Intermediate Programming
____ CS 0441 Discrete Structures for CS
____ CS 0445 Algorithms and Data Structures 1
____ CS 0447 Computer Organization

Advanced Computer Science

____ CS 1501 Algorithms and Data Structures 2
____ CS 1502 Formal Methods in Computer Science
____ CS 1613 Quantum Computer Science

Physics Laboratory Courses

____ PHYS 0219 Basic Lab. Physics or PHYS 0520 Modern Physical Measurements
____ PHYS 0525 Analog and Digital Electronics
____ PHYS 1361 Wave Motion and Optics
____ PHYS 1426 Modern Physics Laboratory
____ PHYS 1415 Quantum Physics at the Nanoscale

Capstone Research or Project or Internship

All majors must complete a capstone experience prior to graduation. It is the intention that this mirror the format of the CS capstone project (physics lacks an equivalent, though directed research is common among physics undergraduates). The requirement can be satisfied by one semester of directed research with a physics or CS faculty member, or a CS Capstone Project (CS 1980, CS 1981). Alternately, students may instead undertake an internship (for CS this requires registration in CS 1900).

Optional Focus in Computer Science or Physics

____ PHYS 1371 Introduction to Quantum Mechanics 2
____ PHYS 1372 Electromagnetic Theory (3 cr.)
____ PHYS 1373 Mathematical Methods of Physics
Or
____Three CS courses (9 cr. total) at 1500 level or above.

Grade requirements

A minimum GPA of 2.0 in departmental courses is required for graduation.

Satisfactory/No Credit option

No PHYS courses beyond the introductory level may be taken on an S/NC basis.

Writing (W) requirement

Students must complete at least one W-course in the major.

Honors major requirements

Honors in physics is granted if in addition to fulfilling all requirements for the major, the student:

- maintains a GPA of 3.2 or higher in the major;
- maintains a cumulative GPA of 3.0 or higher;
- completes PHYS 1903 Directed Research;
- submits a paper detailing the research within the department; and
- presents the research in a public forum (i.e. at the University's Science Symposium, the undergraduate poster fair hosted by the University Honors College).

Education concentration

This concentration removes up to 10 credits of Physics courses from the standard Physics major requirements. This concentration requires seven credits of lab courses instead of the standard 10 credits.

Additional education related courses

____ PSYED 1001 Introduction to Educational Psychology (3 cr.)
____ IL 1580 Foundations of Special Education (3 cr.)

Additional courses emphasizing the broader impact of science; choose at least 3 credits

____ PHYS 0086 Physics and Public Policy (3 cr.)
____ PHYS 0087 Physics and Society (3 cr.)
____ Any course offered by the Department of History of Philosophy and Science

Required courses from the Science electives

Group A

____ CHEM 0110 General Chemistry 1 or CHEM 0710 Honors General Chemistry 1 (4 cr.)
____ CHEM 0120 General Chemistry 2 or CHEM 0720 Honors General Chemistry 2 (4 cr.)

Group B

____ PHYS 0481 Applications of Modem Physics (3 cr.)

Physics courses removed

____ PHYS 1321 Computational Methods in Physics
____ PHYS 1341 Thermodynamics and Statistical Mechanics
____ PHSY 1370 Quantum Mechanics 1

Advising

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