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

**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.

**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).
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 Modern Physics (3 cr.)

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

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