

Prerequisites/Course Sequence for Haverford students pursuing a 4+1 in Scientific Computing with Penn

Background: By the end of the 5th year, students should complete the entire 10-course master's program in Penn Scientific Computing (see pics.upenn.edu/masters-of-engineering-in-scientific-computing for up-to-date details on the master's program). Students can take up to 3 of these 10 courses during their 4 years at Haverford, the remainder during the "+1" at Penn.

Requirements for applying:

The program's admissions process does not have a list of specific required courses or majors; instead, they "welcome applications from candidates who have a strong background in physical or theoretical sciences, engineering, math, or computer science. Some experience with computer programming is also strongly recommended." The core courses of the master's program have the courses below (or their equivalents) as prerequisites, so you would be well-advised to have taken most or all of these courses when you apply:

- Calculus I, II, III (differential, integral, multivariable calculus) – Math 105, 118, 121 at Haverford (some students will place past 105 or 118 due to high school calculus background)
- Linear Algebra – Math 215 at Haverford
- Differential Equations – Math 204 at Haverford
- Partial Differential Equations – Math 397 at Haverford
- "Data Structures and Algorithms" – CS 105&106, or 107 at Haverford
- "Mathematical Foundations of Computer Science" – any course involving proofs should be acceptable, such as Math/CS 231 (Discrete Math) or Math 317 or 333 (Analysis I or Algebra I). The proof content of Haverford's Math 215 might also be sufficient.
- Background in some physical, chemical, or biological science (many of the advanced courses in the master's program involve the application of computing to the sciences)

Undergraduate courses that will strengthen your application and experience:

- An introductory course on scientific computing, such as Math/CS 222 at Haverford
- Additional programming experience beyond the intro CS sequence

Sample Course Sequence (for students placing at Multivariable Calculus level)

Year 1:

- Multivariable Calculus and Linear Algebra (Math 121 and 215, or 215 and 216)
- A year of chemistry or physics (based on placement level)

Year 2:

- Introduction to Computer Science (CS 105 and 106, or 107 by placement)
- Differential Equations (Math 204 or BMC Math 210)
- Some subset of courses below according to availability and your interest:
 - Scientific Computing (Math/CS 222)
 - Analysis I (Math 317)
 - Another yearlong science course

Year 3:

- Partial Differential Equations (Math 397 or versions at Bryn Mawr and Swarthmore; some of these courses require “Analysis I or permission of instructor”)
- Some subset of courses below according to availability and your interest:
 - Scientific Computing (Math/CS 222)
 - Additional Computer Science course(s), e.g., Discrete Math
 - More science courses

Sample Course Sequence (for students placing at Calc II level)

Year 1:

- Calculus II and Multivariable Calculus (Math 118 and 121)
- A year of chemistry or physics (based on placement level)

Year 2:

- Introduction to Computer Science (CS 105 and 106, or 107 by placement)
- Linear Algebra (Math 215)
- Differential Equations (Math 204 or BMC Math 210)
- Some subset of courses below according to availability and your interest:
 - Scientific Computing (Math/CS 222)
 - Analysis I (Math 317)
 - Another yearlong science course

Year 3:

- Partial Differential Equations (Math 397 or versions at Bryn Mawr and Swarthmore; some of these courses require “Analysis I or permission of instructor”)
- Some subset of courses below according to availability and your interest:
 - Scientific Computing (Math/CS 222)
 - Additional Computer Science course(s), e.g., Discrete Math
 - More science courses