Computer Science Degree Requirements (Data Science Option)

1. General Education & Entrance to Major Requirements (55 credits)

• English (9 credits)

ENGL 015S [GWS]	Rhetoric and Composition or ENGL 030S [GWS]	
ENGL 202C [GWS]	Effective Writing: Technical Writing	
CAS 100 [GWS]	Effective Speech	

• Mathematics (10 credits)

MATH 140* [GQ]	Calculus With Analytic Geometry I (4 credits)
MATH 141* [GQ]	Calculus with Analytic Geometry II (4 credits)
MATH 220 [GQ]	Matrices (2 credits)

• Computer Science (6 credits)

CMPSC 131*	Programming and Computation I: Fundamentals
CMPSC 132*	Programming and Computation II: Data Structures

• Natural Sciences

PHYS 211 [GN]	General Physics: Mechanics (4 credits)

Additional 5 credits of any courses with a GN suffix (PHYS 212 recommended)

• Arts†§

  6 credits of any courses with a GA suffix

• Humanities†§

  6 credits of any courses with a GH suffix

• Social & Behavioral Sciences†§

  6 credits of any courses with a GS suffix

• Health & Physical Activities

  3 credits of any courses with a GHA suffix

* Computer Science students must receive a grade of C or better in this course.

† Students may apply 9-6-3 rule.

§ Students must take 6 credits in Integrative Studies (either Inter-domain or Linked) courses. Students must complete at least 3 credits of Single Domain coursework in each of the Knowledge Domains (GA, GH, GHW, GN, GS). A student's use of Inter-Domain courses, substitutions, or other flexibility options cannot replace this requirement.

2. Core Requirements (65 credits)

• Required Computer and Data Science Courses (45 credits)†

DS 220	Data Management for Data Sciences
CMPSC 312	Computer Organization and Architecture
CMPSC 330*	Advanced Programming in C++
CMPSC 360*	Discrete Mathematics for Computer Science
CMPSC 430	Database Design
CMPSC 441	Artificial Intelligence
CMPSC 445	Applied Machine Learning in Data Science
CMPSC 446	Data Mining
CMPSC 460	Principles of Programming Languages
CMPSC 462	Data Structures
CMPSC 463	Design and Analysis of Algorithms
CMPSC 469	Formal Languages with Applications
CMPSC 472	Operating System Concepts
CMPSC 487W	Software Engineering and Design
CMPSC 488	Computer Science Project

* Computer Science students must receive a grade of C or better in this course.

† Students must earn a 2.5 or higher grade point average in the above list of required courses.

Students in the Computer Science (COMP_BS) major, Data Science option, are required to complete 27 of the 33 credits of 400-level prescribed courses for the major, including the senior capstone course, at Penn State Harrisburg. This is in compliance with Faculty Senate Policy 83-80.5.

- Required Mathematics Courses (9 credits)

      STAT 401   Experimental Methods

      STAT 462   Applied Regression Analysis

Select one course from the following.

      STAT 318   Elementary Probability

      MATH 318   Elementary Probability

      STAT 414   Introductory to Probability Theory

- Technical Electives (6 credits)

Select at least 6 credits from the following. Other courses are to be chosen in consultation with the advisor and with program approval.

CMPSC 313	Assembly Language Programming
CMPSC 412	Data Structures Lab (1.5 credits)
CMPSC 413	Algorithms Lab (1.5 credits)
CMPSC 414	Contest Programming (1 credit)
CMPSC 421	Net-Centric Computing
CMPSC 426	Object-Oriented Design
CMPSC 438	Computer Network Architecture and Programming
CMPSC 444	Secure Programming
CMPSC 455	Introduction to Numerical Analysis I
CMPSC 457	Computer Graphics Algorithms
CMPSC 470	Compiler Construction
CMPSC 475	Mobile Applications Programming
CMPSC 496	Independent Studies
CMPSC 497	Special Topics
MATH 401	Introduction to Analysis I
MATH 411	Ordinary Differential Equations
MATH 412	Fourier Series and Partial Differential Equations
MATH 425	Introduction to Operations Research
MATH 430	Linear Algebra and Discrete Models I
MATH 435	Basic Abstract Algebra
MATH 449	Applied Ordinary Differential Equations
MATH 450	Mathematical Modeling
MATH 455	Introduction to Numerical Analysis I
MATH 465	Number Theory
MATH 468	Mathematical Coding Theory
MATH 485	Graph Theory
MATH 496	Independent Studies

MATH 497	Special Topics in Mathematics
STAT 415	Introduction to Mathematical Statistics
STAT 463	Applied Time Series Analysis

• Additional Electives (5 credits)

  5 credits of unrestricted electives at 100-400 level.

3. Additional Requirements

First-Year Seminar, 1 credit of any course with a S, T, X, or PSU designations. This requirement will typically be satisfied by ENGL 015S or ENGL 030S.

United States Cultures and International Cultures Requirements: 3 credits of any course with a US designation and 3 credits of any course with an IL designation. These can be satisfied simultaneously with any of the above requirements, or any course in the degree requirements.

Writing Across the Curriculum requirement is satisfied by CMPSC 487W, a required course in the COMP degree program.

4. List of C or Higher Required Courses

  Computer Science students must receive a grade of C or better in the following courses:

CMPSC 131, 132, 330, 360

MATH 140, 141