

# Data Science with Concentration in Computation and Modeling, B.S.

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Learn more about the Bachelor of Science in Data Science.

Data Science is an interdisciplinary field of study about methods and systems to extract knowledge or insights from large quantities of data coming in various forms. Temple's B.S. in Data Science is designed for students interested in developing expertise in data science. The Computation and Modeling concentration provides the tools necessary to create accurate, robust, and detailed models of real systems in a scientific or professional field. A strong core of mathematics, physics, computational methods and techniques, and data analysis will enable students to model any complex physical system. Elective courses will allow students to specialize in a specific area of interest.

## Undergraduate Contact Information:

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## Bachelor of Science

### Summary of Requirements for the Degree

- University Requirements (123 total s.h.)
  - Students must complete all University requirements including those listed below.
  - All Temple students must take a minimum of two writing-intensive courses at Temple as part of their major. The specific writing-intensive course options for this major are:

Code	Title	Credit Hours
PHYS 2796	Introduction to Modern Physics	4
CIS 4496	Projects in Data Science	3

- Students must complete the General Education (GenEd) requirements.
    - See the General Education section of the *Undergraduate Bulletin* for the GenEd curriculum.
    - Students who complete CST majors receive a waiver for 2 Science & Technology (GS) and 1 Quantitative Literacy (GQ) GenEd courses.
  - Students must satisfy general Temple University residency requirements.
- College Requirements

2 *Data Science with Concentration in Computation and Modeling, B.S.*

- 45 Upper Level (2000+) credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA), or the College of Engineering (ENG).
- 90 credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA), or the College of Engineering (ENG).
- All students in the College of Science and Technology are required to take a one credit first year seminar. SCTC 1001 CST First Year Seminar is the appropriate course option for every entering first year CST major. Transfer students should use SCTC 2001 CST Transfer Seminar to fulfill this requirement. Other courses that fulfill this requirement may be found on the CST College Requirements page.

3. Major Requirements for Bachelor of Science (79-83 s.h.)

At least 9 courses required for the major must be completed at Temple. At least 7 CIS courses must be completed at Temple.

Code	Title	Credit Hours
<b>Introductory Science Requirements</b>		
Select one of the following sets:		8
PHYS 1061 & PHYS 1062	Elementary Classical Physics I and Elementary Classical Physics II	
PHYS 1961 & PHYS 1962	Honors Elementary Classical Physics I and Honors Elementary Classical Physics II	
PHYS 2021 & PHYS 2022	General Physics I and General Physics II	
PHYS 2921 & PHYS 2922	Honors General Physics I and Honors General Physics II	
<b>Calculus Requirements</b>		
MATH 1041 or MATH 1941	Calculus I Honors Calculus I	4
MATH 1042 or MATH 1942	Calculus II Honors Calculus II	4
<b>Math Methods in Computing Requirements</b>		
CIS 1166 or CIS 1966	Mathematical Concepts in Computing I Honors Mathematical Concepts in Computing I	4
CIS 2166	Mathematical Concepts in Computing II	4
<b>Probability and Statistics Requirements</b>		
MATH 3031	Probability Theory I	3
MATH 3032	Mathematical Statistics	3
<b>Programming Requirements</b>		
CIS 1068 or CIS 1968	Program Design and Abstraction Honors Program Design and Abstraction	4
CIS 2168	Data Structures	4
<b>Common Specialty Course Requirements</b>		
CIS 3715	Principles of Data Science	4
CIS 4496	Projects in Data Science	3
<b>Concentration Requirements</b>		
CIS 3223	Data Structures and Algorithms	3
MATH 2043 or MATH 2943	Calculus III Honors Calculus III	4
Select one of the following:		3-4
MATH 2045	Differential Equations with Linear Algebra	
MATH 2101	Linear Algebra	
MATH 2103	Linear Algebra with Computer Lab	
MATH 3043	Numerical Analysis I	4
PHYS 2511	Scientific Computing I	1.5
PHYS 3511	Scientific Computing II	1.5
PHYS 2502	Mathematical Physics	4
PHYS 2796	Introduction to Modern Physics	4

**Computation and Modeling Elective Requirements**

Select from the following list:

9-12

CEE 3048	Probability, Statistics & Stochastic Methods
CIS 3219	Computer Graphics and Image Processing
CIS 4523	Knowledge Discovery and Data Mining
or CIS 5523	Knowledge Discovery and Data Mining
CIS 4524	Analysis and Modeling of Social and Information Networks
or CIS 5524	Analysis and Modeling of Social and Information Networks
CIS 4526	Foundations of Machine Learning
EES 3011	Remote Sensing and GIS
MATH 3044	Numerical Analysis II
MATH 4033	Probability Theory II
MATH 4041	Partial Differential Equations
MATH 4043	Applied Mathematics
MATH 5043	Introduction to Numerical Analysis
PHYS 2101	Classical Mechanics
PHYS 3101	Analytical Mechanics
PHYS 3301	Electricity and Magnetism
PHYS 3302	Classical Electromagnetism
PHYS 3701	Introduction to Quantum Mechanics I
PHYS 4101	Thermal Physics
PHYS 4302	Optics
PHYS 4701	Introduction to Solid State Physics
PHYS 4702	Introduction to Quantum Mechanics II
PHYS 4091	Undergraduate Research (max of 3 credits across all independent study)
MATH 4082	Senior Individual Study (max of 3 credits across all independent study)

**Total Credit Hours****79-83****Calculation of Major GPA**

Courses listed under the major requirements for the degree will be included in the calculation of the major GPA. Courses that could not apply toward the major as an elective or a required course are not counted in the calculation of the major GPA.

**Distinction in Major**

To graduate with Distinction in Major, students are required to have a 3.50 or higher grade point average (GPA) both in the major and overall, as well as be recommended by the department of Computer & Information Sciences.

**Suggested Academic Plan****Bachelor of Science in Data Science with Concentration in Computation and Modeling****Requirements for New Students starting in the 2021-2022 Academic Year**

Year 1		Credit Hours
<b>Fall</b>		
CIS 1068 or 1968	Program Design and Abstraction	4
MATH 1041 or 1941	Calculus I	4
SCTC 1001	CST First Year Seminar	1
ENG 0802, 0812, or 0902	Analytical Reading and Writing [GW]	4
GenEd Breadth Course		3
<b>Term Credit Hours</b>		<b>16</b>
<b>Spring</b>		
CIS 1166 or 1966	Mathematical Concepts in Computing I	4
MATH 1042 or 1942	Calculus II	4
IH 0851 or 0951	Intellectual Heritage I: The Good Life [GY]	3

GenEd Breadth Course		3
<b>Term Credit Hours</b>		<b>14</b>
<b>Year 2</b>		
<b>Fall</b>		
CIS 2166	Mathematical Concepts in Computing II	4
CIS 2168	Data Structures	4
MATH 2043 or 2943	Calculus III	4
Select one of the following:		4
PHYS 1061	Elementary Classical Physics I	
PHYS 1961	Honors Elementary Classical Physics I	
PHYS 2021	General Physics I	
PHYS 2921	Honors General Physics I	
<b>Term Credit Hours</b>		<b>16</b>
<b>Spring</b>		
CIS 3223	Data Structures and Algorithms	3
CIS 3715	Principles of Data Science (S)	4
Select one of the following; must be continuation of prior Physics course:		4
PHYS 1062	Elementary Classical Physics II	
PHYS 1962	Honors Elementary Classical Physics II	
PHYS 2022	General Physics II	
PHYS 2922	Honors General Physics II	
PHYS 2511	Scientific Computing I	1.5
IH 0852 or 0952	Intellectual Heritage II: The Common Good [GZ]	3
<b>Term Credit Hours</b>		<b>15.5</b>
<b>Year 3</b>		
<b>Fall</b>		
MATH 3031	Probability Theory I	3
Select one of the following:		3-4
MATH 2045	Differential Equations with Linear Algebra	
MATH 2101	Linear Algebra	
MATH 2103	Linear Algebra with Computer Lab (F)	
PHYS 3511	Scientific Computing II	1.5
GenEd Breadth Course		3-4
GenEd Breadth Course		3
Elective		2-0
<b>Term Credit Hours</b>		<b>15.5</b>
<b>Spring</b>		
MATH 3032	Mathematical Statistics (S)	3
PHYS 2502	Mathematical Physics (S)	4
PHYS 2796	Introduction to Modern Physics [WI] (S)	4
GenEd Breadth Course		3
Elective		1
<b>Term Credit Hours</b>		<b>15</b>
<b>Year 4</b>		
<b>Fall</b>		
MATH 3043	Numerical Analysis I (F)	4
Data Science: Computation & Modeling Elective		3-4
Data Science: Computation & Modeling Elective		3-4
Elective		3
Elective		3-1
<b>Term Credit Hours</b>		<b>16</b>
<b>Spring</b>		

CIS 4496	Projects in Data Science [WI]	3
Data Science: Computation & Modeling Elective		3-4
Elective		3
Elective		3
Elective		3-2

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**Term Credit Hours** **15**

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**Total Credit Hours:** **123**

<b>Code</b>	<b>Title</b>	<b>Credit Hours</b>
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(F) - Fall only course

(S) - Spring only course