Data Science BS with Computation and Modeling Concentration

Overview

Science and technology are the foundations of our future. The Department of Computer and Information Sciences (CIS) is focused on the understanding of fundamental scientific principles and the application of these principles to solving complex problems, using computing technology.

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. The **Bachelor of Science in Data Science** is designed for students interested in developing expertise in data science.

Data Science students **must select one of the following concentrations**:

- Computation and Modeling
- Computational Analytics
- Genomics and Bioinformatics

The **Concentration in Computation and Modeling** 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.

Campus Location: Main

Program Code: ST-DTSC-BS

Distinction in Major

To graduate with distinction in this major, a student must satisfy the following criteria:

- have a minimum 3.50 major GPA and
- have a minimum 3.50 cumulative GPA.

Accelerated Programs

Accelerated programs provide a pathway for students to pursue both an undergraduate degree and an advanced degree in a shorter amount of time. Below is a list of available accelerated programs for students in the BS in Data Science.

- BS in Data Science / MS in Computational Data Science

Undergraduate Contact Information

Department of Computer and Information Sciences
Jamie Payton, Chair
Science, Education and Research Center, Room 304
215-204-8450

Gene Kwatny, Vice Chair
Science, Education and Research Center, Room 304
215-204-8450

Andrew Rosen, Faculty Advisor
Science, Education and Research Center, Room 349
215-204-3193
andrew.rosen@temple.edu

Department of Physics
Bernd Surrow, Chair
Science, Education and Research Center, Room 406
215-204-7736

Adrienn Ruzsinszky, Vice Chair
Science, Education and Research Center, Room 708
215-204-8479

Matthew Newby, Faculty Advisor
Science, Education and Research Center, Room 476
215-204-2642
matthew.newby@temple.edu

Learn more about the Bachelor of Science in Data Science.

These requirements are for students who matriculated in academic year 2023-2024. Students who matriculated prior to fall 2023 should refer to the Archives *to view the requirements for their Bulletin year.*

Bachelor of Science Requirements

Summary of Requirements for the Degree

1. University Requirements (123 total s.h.)
   - Students must complete all University requirements including those listed below.
   - All undergraduate students must complete at least two writing-intensive courses for a total of at least six credits 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.
2. College Requirements
   - A minimum of 90 total credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA), and/or the College of Engineering (ENG).
     - A minimum of 45 of these credits must be upper-level (courses numbered 2000 and above).
   - Complete a one-credit first-year or transfer seminar.
     - SCTC 1001 CST First Year Seminar for every entering first-year CST student.
     - SCTC 2001 CST Transfer Seminar for every entering transfer CST student.
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 4 CIS courses must be completed at Temple.

Code	Title	Credit Hours
Introductory Science Requirements		
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	
Calculus Requirements		
MATH 1041	Calculus I	4
or MATH 1941	Honors Calculus I	
MATH 1042	Calculus II	4
or MATH 1942	Honors Calculus II	
Math Methods in Computing Requirements		
CIS 1166	Mathematical Concepts in Computing I	4
or CIS 1966	Honors Mathematical Concepts in Computing I	
CIS 2166	Mathematical Concepts in Computing II	4
Probability and Statistics Requirements		

MATH 3031	Probability Theory I	3
MATH 3032	Mathematical Statistics	3
Programming Requirements		
CIS 1068	Program Design and Abstraction	4
or CIS 1968	Honors Program Design and Abstraction	
CIS 2168	Data Structures	4
Common Specialty Course Requirements		
CIS 3715	Principles of Data Science	4
CIS 4496	Projects in Data Science	3
Concentration Requirements		
CIS 3223	Data Structures and Algorithms	3
MATH 2043	Calculus III	4
or MATH 2943	Honors Calculus III	
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 2121	Mathematical Modeling and Simulation	
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**

Suggested Academic Plan

Bachelor of Science in Data Science with Concentration in Computation and Modeling
Suggested Plan for New Students Starting in the 2023-2024 Academic Year

Year 1		
Fall		**Credit Hours**

CIS 1068
    or CIS 1968
	Program Design and Abstraction
	        or Honors Program Design and Abstraction
		4

MATH 1041
    or MATH 1941
	Calculus I
	        or Honors Calculus I
		4

SCTC 1001	CST First Year Seminar	1

ENG 0802
    or ENG 0812
    or ENG 0902
	Analytical Reading and Writing
	        or Analytical Reading and Writing: ESL
	        or Honors Writing About Literature
		4

GenEd Breadth Course		3
	Credit Hours	**16**
Spring		

CIS 1166
    or CIS 1966
	Mathematical Concepts in Computing I
	        or Honors Mathematical Concepts in Computing I
		4

MATH 1042
    or MATH 1942
	Calculus II
	        or Honors Calculus II
		4

IH 0851
    or IH 0951
	Intellectual Heritage I: The Good Life
	        or Honors Intellectual Heritage I: The Good Life
		3

GenEd Breadth Course		3
	Credit Hours	**14**
Year 2		
Fall		
CIS 2166	Mathematical Concepts in Computing II	4
CIS 2168	Data Structures	4

MATH 2043
    or MATH 2943
	Calculus III
	        or Honors 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	
	Credit Hours	**16**
Spring		
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 IH 0952
	Intellectual Heritage II: The Common Good
	        or Honors Intellectual Heritage II: The Common Good
		3

	Credit Hours	**15.5**
Year 3		
Fall		
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
	Credit Hours	**15.5**
Spring		
MATH 3032	Mathematical Statistics (S)	3
PHYS 2502	Mathematical Physics (S)	4
PHYS 2796	Introduction to Modern Physics (S)	4
GenEd Breadth Course		3
Elective		1
	Credit Hours	**15**
Year 4		
Fall		
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
	Credit Hours	**16**
Spring		
CIS 4496	Projects in Data Science	3
Data Science: Computation & Modeling Elective		3-4
Elective		3
Elective		3
Elective		3-2
	Credit Hours	**15**
	Total Credit Hours	**123**

Code	Title	Credit Hours
(F) - Fall only course		
(S) - Spring only course		