Data Science BS with Computational Analytics 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 Computational Analytics** provides a strong background in mathematics, algorithmic and computational thinking, computer systems, and data analysis, and will enable students to analyze large quantities of data to discover new knowledge and facilitate decision making.

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

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Learn more about the Bachelor of Science in Data Science.

These requirements are for students who matriculated in academic year 2024-2025. Students who matriculated prior to fall 2024 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
CIS 3296	Software Design	3-4
or ENG 2696	Technical Writing	
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 (81-86 s.h.)

   At least 9 courses required for the major must be completed at Temple. At least 6 CIS courses must be completed at Temple.

Code	Title	Credit Hours
Introductory Science Requirements		
Must select either the Chemistry sequence or the Physics sequence		8
CHEM 1031 & CHEM 1032 & CHEM 1033 & CHEM 1034	General Chemistry I and General Chemistry II and General Chemistry Laboratory I and General Chemistry Laboratory II	
CHEM 1951 & CHEM 1952 & CHEM 1953 & CHEM 1954	Honors General Chemical Science I and Honors General Chemical Science II and Honors Chemical Science Laboratory I and Honors Chemical Science Laboratory II	
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 2107	Computer Systems and Low-Level Programming	4
CIS 3223	Data Structures and Algorithms	3
CIS 4331	Principles of Database Systems	4
CIS 4517	Data-Intensive and Cloud Computing	3
CIS 4526	Foundations of Machine Learning	3
Select one of the following:		3-4
CIS 3296	Software Design [1]	
ENG 2696	Technical Writing	
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	
Computational Analytics Elective Requirements		
Select from the following list:		9-12
BIOE 3301	Biomedical Signals and Systems	
CEE 3048	Probability, Statistics & Stochastic Methods	
CEE 3711	Environmental Engineering	
CEE 4221	Intelligent Transportation Systems	
CEE 4531	Life Cycle Assessment and Carbon Footprinting	
CIS 3203	Introduction to Artificial Intelligence	
CIS 3207	Introduction to Systems Programming and Operating Systems	
CIS 3219	Computer Graphics and Image Processing	
CIS 3381	Cooperative Education Experience in Computer Science [2]	
CIS 3515	Introduction to Mobile Application Development	
CIS 3605	Introduction to Digital Forensics	
CIS 4282	Independent Study [2]	
CIS 4382	Independent Study [2]	
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	
EES 3011	Remote Sensing and GIS	
HCM 3501	Introduction to Health Services Systems	
MATH 3043	Numerical Analysis I	
MATH 3044	Numerical Analysis II	
MATH 4033	Probability Theory II	
MATH 4043	Applied Mathematics	
MKTG 3508	Digital Marketing (need permission to register)	
MKTG 3509	Customer Data Analytics (need permission to register)	
STAT 2522	Survey Design and Sampling	
STAT 2523	Design of Experiments and Quality Control	

STAT 3504	Time Series and Forecasting Models	
STAT 3506	Nonparametric and Categorical Data Analysis	
Total Credit Hours		**81-86**

1 CIS 3296 has a prerequisite of CIS 3207.
2 A maximum of four credits from CIS 3381, CIS 4282 and/or CIS 4382 may be used to fulfill the Data Science elective requirement.

Suggested Academic Plan

Bachelor of Science in Data Science with Concentration in Computational Analytics

Suggested Plan for New Students Starting in the 2024-2025 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 [GW] or Analytical Reading and Writing: ESL [GW] or Honors Analytical Reading and Writing [GW]	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 [GY] or Honors Intellectual Heritage I: The Good Life [GY]	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 Chemistry or Physics sequences:		4
CHEM 1031 & CHEM 1033	General Chemistry I and General Chemistry Laboratory I	
CHEM 1951 & CHEM 1953	Honors General Chemical Science I and Honors Chemical Science Laboratory I	
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 2107	Computer Systems and Low-Level Programming	4
CIS 3223	Data Structures and Algorithms	3
CIS 3715	Principles of Data Science (S)	4
Select one of the following. Note: Must be continuation of the Chemistry or Physics course taken in prior semester:		4

CHEM 1032 & CHEM 1034	General Chemistry II and General Chemistry Laboratory II	
CHEM 1952 & CHEM 1954	Honors General Chemical Science II and Honors Chemical Science Laboratory II	
PHYS 1062	Elementary Classical Physics II	
PHYS 1962	Honors Elementary Classical Physics II	
PHYS 2022	General Physics II	
PHYS 2922	Honors General Physics II	
	Credit Hours	**15**
Year 3		
Fall		
CIS 4331	Principles of Database Systems	4
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)	
IH 0852 or IH 0952	Intellectual Heritage II: The Common Good [GZ] or Honors Intellectual Heritage II: The Common Good [GZ]	3
Elective		3-2
	Credit Hours	**16**
Spring		
CIS 4517	Data-Intensive and Cloud Computing (S)	3
MATH 3032	Mathematical Statistics (S)	3
GenEd Breadth Course		3-4
GenEd Breadth Course		3
Elective		3
Elective		1-0
	Credit Hours	**16**
Year 4		
Fall		
CIS 4526	Foundations of Machine Learning (F)	3
Data Science: Computational Analytics Elective		3-4
Data Science: Computational Analytics Elective		3-4
GenEd Breadth Course		3
Elective		3-1
	Credit Hours	**15**
Spring		
CIS 4496	Projects in Data Science [WI]	3
Select one of the following:		3-4
CIS 3296	Software Design [WI] [1]	
ENG 2696	Technical Writing [WI]	
Data Science: Computational Analytics Elective		3-4
Elective		3
Elective		3-1
	Credit Hours	**15**
	Total Credit Hours	**123**

Code	**Title**	**Credit Hours**

(F) - Fall only course

(S) - Spring only course

[1] CIS 3296 has a prerequisite of CIS 3207.

Accelerated Programs

Students may opt to pursue an accelerated +1 program, enabling them to complete both a bachelor's degree and master's degree in less time than the traditional route.

The following accelerated programs may be of interest to students in the Data Science BS with Computational Analytics Concentration:

College of Science and Technology

- Computational Data Science MS