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

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:

Dr. Jamie Payton, Chair
Science Education and Research Center, Room 304
215-204-8450

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

Dr. Anthony Hughes, Faculty Advisor
Science Education and Research Center, Room 344
215-204-7910
anthony.hughes@temple.edu

Bachelor of Science

Summary of Requirements for the Degree

1. University Requirements (123 total s.h.)
   - MATH 0701 (4 s.h.) and/or ENG 0701 (4 s.h.), if required by placement testing.
   - All Temple students must take a minimum of two writing-intensive courses at Temple as part of their major: PHYS 2796 and SCTC xx96.
   - 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 typically 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
   - 45 Upper Level (2000+) credits within the College of Science & Technology (CST) or the College of Liberal Arts (CLA).
   - 90 credits within the College of Science & Technology (CST) or the College of Liberal Arts (CLA).
   - First Year Seminar Requirement: All students in the College of Science & Technology (CST) are required to take a 1 credit first year seminar course, SCTC 1001 CST First Year Seminar. Other courses that fulfill this requirement may be found on the CST College Requirements page. Only one course in this category may count towards graduation.

3. Major Requirements for Bachelor of Science (78-80 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.

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>PHYS 1061</td>
<td>Elementary Classical Physics I</td>
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<tr>
<td>PHYS 1062</td>
<td>and Elementary Classical Physics II</td>
<td></td>
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<tr>
<td>PHYS 1961</td>
<td>Honors Elementary Classical Physics I</td>
<td></td>
</tr>
<tr>
<td>PHYS 1962</td>
<td>and Honors Elementary Classical Physics II</td>
<td></td>
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<tr>
<td>PHYS 2021</td>
<td>General Physics I</td>
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<tr>
<td>PHYS 2022</td>
<td>and General Physics II</td>
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<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
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<td>PHYS 2921 &amp; PHYS 2922</td>
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<td>Calculus I</td>
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<td>or MATH 1941</td>
<td>Honors Calculus I</td>
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<tr>
<td>MATH 1042</td>
<td>Calculus II</td>
<td>4</td>
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<tr>
<td>or MATH 1942</td>
<td>Honors Calculus II</td>
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<td>CIS 1166</td>
<td>Mathematical Concepts in Computing I</td>
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<td>or CIS 1966</td>
<td>Honors Mathematical Concepts in Computing I</td>
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<tr>
<td>CIS 2166</td>
<td>Mathematical Concepts in Computing II</td>
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<td><strong>Probability and Statistics Requirements</strong></td>
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<tr>
<td>MATH 3031</td>
<td>Probability Theory I</td>
<td>3</td>
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<td>MATH 3032</td>
<td>Mathematical Statistics</td>
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<td><strong>Programming Requirements</strong></td>
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<tr>
<td>CIS 1068</td>
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<td>or CIS 1968</td>
<td>Honors Program Design and Abstraction</td>
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<tr>
<td>CIS 2168</td>
<td>Data Structures</td>
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<td><strong>Common Specialty Course Requirements</strong></td>
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<td>CIS 3715</td>
<td>Principles of Data Science</td>
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<td>SCTC xx96</td>
<td>(Advanced Data Visualization)</td>
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<td><strong>Concentration Requirements</strong></td>
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<tr>
<td>CIS 3223</td>
<td>Data Structures and Algorithms</td>
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<td>MATH 2043</td>
<td>Calculus III</td>
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<tr>
<td>or MATH 2943</td>
<td>Honors Calculus III</td>
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<tr>
<td>MATH 3045</td>
<td>Differential Equations with Linear Algebra</td>
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<tr>
<td>MATH 2101</td>
<td>Linear Algebra</td>
<td></td>
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<tr>
<td>MATH 2103</td>
<td>Linear Algebra with Computer Lab</td>
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<tr>
<td>MATH 3043</td>
<td>Numerical Analysis I</td>
<td>3 to 4</td>
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<tr>
<td>PHYS 2511</td>
<td>Scientific Computing I</td>
<td>1.5</td>
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<td>PHYS 3511</td>
<td>Scientific Computing II</td>
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<td>PHYS 2502</td>
<td>Mathematical Physics</td>
<td>4</td>
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<tr>
<td>PHYS 2796</td>
<td>Introduction to Modern Physics</td>
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<td><strong>Computation and Modeling Elective Requirements</strong></td>
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<tr>
<td>CEE 3048</td>
<td>Probability, Statistics &amp; Stochastic Methods</td>
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<tr>
<td>CIS 3219</td>
<td>Computer Graphics and Image Processing</td>
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</tr>
<tr>
<td>CIS 4523</td>
<td>Knowledge Discovery and Data Mining</td>
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<tr>
<td>or CIS 5523</td>
<td>Knowledge Discovery and Data Mining</td>
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<tr>
<td>CIS 4524</td>
<td>Analysis and Modeling of Social and Information Networks</td>
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<tr>
<td>or CIS 5524</td>
<td>Analysis and Modeling of Social and Information Networks</td>
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<tr>
<td>CIS 4526</td>
<td>Foundations of Machine Learning</td>
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<td>EES 3011</td>
<td>Remote Sensing and GIS</td>
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<td>MATH 3044</td>
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<td>MATH 4033</td>
<td>Probability Theory II</td>
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<td>MATH 4041</td>
<td>Partial Differential Equations</td>
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<tr>
<td>MATH 4043</td>
<td>Applied Mathematics</td>
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<tr>
<td>MATH 5043</td>
<td>Introduction to Numerical Analysis</td>
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<td>PHYS 2101</td>
<td>Classical Mechanics</td>
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<tr>
<td>PHYS 3101</td>
<td>Analytical Mechanics</td>
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<tr>
<td>PHYS 3301</td>
<td>Electricity and Magnetism</td>
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</table>
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 78-80.00

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 2019-2020 Academic Year

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Fall</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>CIS 1068 or 1968</td>
<td>4</td>
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<tr>
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<td>MATH 1041 or 1941</td>
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<td></td>
<td>Term Credit Hours</td>
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<tr>
<td></td>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CIS 1166 or 1966</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MATH 1042 or 1942</td>
<td>4</td>
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<td>General Education/Elective Credits</td>
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<th>Year 2</th>
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<tr>
<td></td>
<td>CIS 2166</td>
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<tr>
<td></td>
<td>CIS 2168</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MATH 2043 or 2943</td>
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<tr>
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<tr>
<td></td>
<td>PHYS 1061</td>
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<tr>
<td></td>
<td>PHYS 1961</td>
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</tr>
<tr>
<td></td>
<td>PHYS 2021</td>
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<td></td>
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<tr>
<td></td>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CIS 3223</td>
<td>3</td>
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<tr>
<td></td>
<td>CIS 3715</td>
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<td>Select one of the following; must be continuation of prior Physics course:</td>
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<tr>
<td></td>
<td>PHYS 1062</td>
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</tr>
<tr>
<td></td>
<td>PHYS 1962</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PHYS 2022</td>
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<td></td>
<td>Term Credit Hours</td>
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<tr>
<td>Code</td>
<td>Title</td>
<td>Credit Hours</td>
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<tr>
<td>---------</td>
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<tr>
<td>PHYS 2922</td>
<td>Honors General Physics II</td>
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<td>PHYS 2511</td>
<td>Scientific Computing I</td>
<td>1.5</td>
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<td>General Education/Elective Credits</td>
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### Year 3

#### Fall

<table>
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<tr>
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<tr>
<td>MATH 3031</td>
<td>Probability Theory I</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>MATH 3045</td>
<td>Differential Equations with Linear Algebra (F)</td>
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<tr>
<td>MATH 2101</td>
<td>Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 2103</td>
<td>Linear Algebra with Computer Lab (F)</td>
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</tr>
<tr>
<td>PHYS 3511</td>
<td>Scientific Computing II</td>
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<tr>
<td>General Education/Elective Credits</td>
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#### Spring

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<th>Course Title</th>
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<tr>
<td>MATH 3032</td>
<td>Mathematical Statistics (S)</td>
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<td>PHYS 2502</td>
<td>Mathematical Physics (S)</td>
<td>4</td>
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<tr>
<td>PHYS 2796</td>
<td>Introduction to Modern Physics [WI] (S)</td>
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<td>General Education/Elective Credits</td>
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### Year 4

#### Fall

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<tr>
<td>MATH 3043</td>
<td>Numerical Analysis I (F)</td>
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<tr>
<td>Data Science: Computation &amp; Modeling Elective</td>
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<td>Data Science: Computation &amp; Modeling Elective</td>
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#### Spring

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<tbody>
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<td>SCTC xx96</td>
<td>(S)</td>
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<td>General Education/Elective Credits</td>
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### Code

- (F) - Fall only course
- (S) - Spring only course