DATA SCIENCES, B.S. (ENGINEERING)

Begin Campus: Any Penn State Campus
End Campus: University Park

Degree Requirements
For the Bachelor of Science degree in Data Sciences, a minimum of 123 credits is required:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Electives</td>
<td>3-12</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>72-81</td>
</tr>
</tbody>
</table>

6 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 6 credits of GQ courses.

Requirements for the Major
To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

Common Requirements for the Major (All Options)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prescribed Courses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prescribed Courses: Require a grade of C or better</td>
<td></td>
</tr>
<tr>
<td>DS 220</td>
<td>Data Management for Data Sciences</td>
<td>3</td>
</tr>
<tr>
<td>DS 340W</td>
<td>Applied Data Sciences</td>
<td>3</td>
</tr>
<tr>
<td>DS 435</td>
<td>Ethical Issues in Data Science Practice</td>
<td>3</td>
</tr>
<tr>
<td>MATH 140</td>
<td>Calculus With Analytic Geometry I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Calculus with Analytic Geometry II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 220</td>
<td>Matrices</td>
<td>2</td>
</tr>
<tr>
<td>STAT 184</td>
<td>Introduction to R</td>
<td>2</td>
</tr>
<tr>
<td>STAT 380</td>
<td>Data Science Through Statistical Reasoning and Computation</td>
<td>3</td>
</tr>
</tbody>
</table>

Select 6 credits from any combination:

- DS 402 Emerging Trends in the Data Sciences
- DS 420 Network Analytics
- DS/CMPSC 442 Artificial Intelligence
- DS 494 Research Project
- IST 441 Information Retrieval and Organization
- IST 442 Information Technology in an International Context
- SODA 308 Research Design for Social Data Analytics

Additional Courses: Require a grade of C or better
Select 3 credits from the following:

- CMPSC 360 Discrete Mathematics for Computer Science
- IST 230 Language, Logic, and Discrete Mathematics
- MATH 311W Concepts of Discrete Mathematics

Select 3 credits from the following:

- STAT/MATH 318 Elementary Probability
- STAT/MATH 414 Introduction to Probability Theory
- STAT/MATH 418 Introduction to Probability and Stochastic Processes for Engineering

Supporting Courses and Related Areas
Select 12 credits from the lists of Application Focus courses; 6 credits must at the 300- or 400-levels.

LIST OF APPLIED DATA SCIENCES COURSES (https://bulletins.psu.edu/undergraduate/colleges/information-sciences-technology/data-sciences-bs/#suggestedacademicplancotent)

Computational Data Sciences (DTSCE_BS): 47 credits
Only Available through the College of Engineering

<table>
<thead>
<tr>
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<tr>
<td></td>
<td>Prescribed Courses</td>
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<tr>
<td></td>
<td>Prescribed Courses: Require a grade of C or better</td>
<td></td>
</tr>
<tr>
<td>CMPSC 221</td>
<td>Object Oriented Programming with Web-Based Applications</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 360</td>
<td>Discrete Mathematics for Computer Science</td>
<td>3</td>
</tr>
</tbody>
</table>
CMPS 442 Artificial Intelligence 3
CMPS 448 Machine Learning and Algorithmic AI 3
CMPS 461 Programming Language Concepts 3
CMPS 465 Data Structures and Algorithms 3
DS/CMPS 410 Programming Models for Big Data 3
MATH 230 Calculus and Vector Analysis 4
STAT/MATH 414 Introduction to Probability Theory 3
STAT/MATH 415 Introduction to Mathematical Statistics 3

Additional Courses
Additional Courses: Require a grade of C or better
DS 200 Introduction to Data Sciences 4
or STAT 200 Elementary Statistics

Supporting Courses and Related Areas
Select 6 credits from Computational Option List A in Appendix C 6
Select 6 credits from Computational Option List B in Appendix C 6

1 Students may apply up to 3 credits of ROTC as option list credits and 3 credits of ROTC as GHW credits.

LIST OF COMPUTATIONAL DATA SCIENCES COURSES (http://www.eecs.psu.edu/students/undergraduate/Data-Sciences.aspx)

Statistical Modeling Data Sciences (DTSCS_BS): 38 credits
Only Available through the Eberly College of Science

Prescribed Courses
Exposed Courses: Require a grade of C or better
MATH 230 Calculus and Vector Analysis 4
STAT/MATH 414 Introduction to Probability Theory 3
STAT/MATH 415 Introduction to Mathematical Statistics 3
STAT 440 Computational Statistics 3
STAT 462 Applied Regression Analysis 3

Additional Courses
Additional Courses: Require a grade of C or better
DS 200 Introduction to Data Sciences 4
or STAT 200 Elementary Statistics
DS 310 Machine Learning for Data Analytics 3
or CMPS 448 Machine Learning and Algorithmic AI
MATH 311W Concepts of Discrete Mathematics 3
or CMPS 360 Discrete Mathematics for Computer Science

Supporting Courses and Related Areas
Select 6 credits from Statistical Modeling Option List A courses, see Appendix D 6
Select 6 credits from Statistical Modeling Option List B courses, see Appendix D 6

1 Students may apply up to 3 credits of ROTC as option list credits and 3 credits of ROTC as GHW credits.

LIST OF STATISTICAL MODELING DATA SCIENCES COURSES (https://bulletins.psu.edu/undergraduate/colleges/eberly-science/data-sciences-bs/#suggestedacademicplan-text)

General Education
Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)
• Quantification (GQ): 6 credits
• Writing and Speaking (GWS): 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)
• Arts (GA): 3 credits
• Health and Wellness (GHW): 3 credits
• Humanities (GH): 3 credits
• Social and Behavioral Sciences (GS): 3 credits
• Natural Sciences (GN): 3 credits

Integrative Studies
• Inter-Domain Courses (Inter-Domain): 6 credits

Exploration
• GN, may be completed with Inter-Domain courses: 3 credits
• GA, GH, GN, GS, Inter-Domain courses. This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 6 credits

University Degree Requirements
First Year Engagement
All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement
6 credits are required and may satisfy other requirements
• United States Cultures: 3 credits
• International Cultures: 3 credits
Writing Across the Curriculum
3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits
A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work
Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition
The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80)). For more information, check the Suggested Academic Plan for your intended program.