

# DATA SCIENCES, B.S. (INFORMATION SCIENCES AND TECHNOLOGY)

**Begin Campus:** Any Penn State Campus

**End Campus:** University Park

## Degree Requirements

For the Bachelor of Science degree in Data Sciences, a minimum of 125 credits is required (at least 18 credits must be taken at the 400 level):

| Requirement                | Credits |
|----------------------------|---------|
| General Education          | 45      |
| Electives                  | 5-14    |
| Requirements for the Major | 72-81   |

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

### 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.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

### Knowledge Domains

- **Arts (GA):** 6 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 6 credits
- **Social and Behavioral Sciences (GS):** 6 credits
- **Natural Sciences (GN):** 9 credits

### Integrative Studies (may also complete a Knowledge Domain requirement)

- **Inter-Domain or Approved Linked Courses:** 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 (<http://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.

### 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 (<http://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)

| Code  | Title  | Credits |
|---|--|---------|
| <b>Prescribed Courses</b>                                 |  |         |
| <i>Prescribed Courses: Require a grade of C or better</i> |  |         |
| DS 220  | Data Management for Data Sciences                          | 3       |
| DS 300  | Privacy and Security for Data Sciences                     | 3       |
| DS 340W   | Applied Data Sciences                                      | 3       |
| DS 440  | Data Sciences Capstone Course                              | 3       |
| MATH 140  | Calculus With Analytic Geometry I                          | 4       |
| MATH 141  | Calculus with Analytic Geometry II                         | 4       |
| MATH 220  | Matrices   | 2       |
| STAT 184  | Introduction to R  | 2       |
| STAT 380  | Data Science Through Statistical Reasoning and Computation | 3       |
| <b>Additional Courses</b>                                 |  |         |
| 1 credit of First-Year Seminar                            |  | 1       |

*Additional Courses: Require a grade of C or better*

|                      |   |   |
|----------------------|---|---|
| CMPSC 121            | Introduction to Programming Techniques          | 3 |
| or CMPSC 131         | Programming and Computation I: Fundamentals     |   |
| CMPSC 122            | Intermediate Programming                        | 3 |
| or CMPSC 132         | Programming and Computation II: Data Structures |   |
| STAT/MATH 318        | Elementary Probability                          | 3 |
| or STAT/<br>MATH 414 | Introduction to Probability Theory              |   |

**Requirements for the Option**

|                  |       |
|------------------|-------|
| Select an option | 35-44 |
|------------------|-------|

**Requirements for the Option****Applied Data Sciences (DATSC\_BS): 38 credits****Only Available through the College of Information Sciences and Technology**

| Code | Title | Credits |
|------|-------|---------|
|------|-------|---------|

**Prescribed Courses***Prescribed Courses: Require a grade of C or better*

|         |   |   |
|---------|---|---|
| DS 200  | Introduction to Data Sciences             | 4 |
| DS 310  | Machine Learning for Data Analytics       | 3 |
| DS 320  | Data Integration                          | 3 |
| DS 330  | Visual Analytics for Data Sciences        | 3 |
| DS 410  | Programming Models for Big Data           | 3 |
| IST 230 | Language, Logic, and Discrete Mathematics | 3 |
| IST 495 | Internship                                | 1 |

**Additional Courses**

|  |   |
|--|---|
| Select 6 credits from any combination: | 6 |
|--|---|

|          |  |  |
|----------|--|--|
| DS 402   | Emerging Trends in the Data Sciences               |  |
| DS 442   | Artificial Intelligence                            |  |
| IST 441  | Information Retrieval and Organization             |  |
| IST 442  | Information Technology in an International Context |  |
| IST 445  | Globalization Trends and World Issues              |  |
| IST 462  | Database Modeling and Applications                 |  |
| SODA 308 | Research Design for Social Data Analytics          |  |

**Supporting Courses and Related Areas**<sup>1</sup>

|  |    |
|--|----|
| Select 12 credits from the lists of Application Focus courses in Appendix B; 6 credits must be at the 400 level. | 12 |
|--|----|

<sup>1</sup> Students may apply up to 3 credits of ROTC as option Application Focus list credits and 3 credits of ROTC as GHW credits.

LIST OF APPLIED DATA SCIENCES COURSES (p. )

**Computational Data Sciences (DTSCE\_BS): 44 credits****Only Available through the College of Engineering**

| Code | Title | Credits |
|------|-------|---------|
|------|-------|---------|

**Prescribed Courses**

|           |                                     |   |
|-----------|-------------------------------------|---|
| CMPSC 448 | Machine Learning and Algorithmic AI | 3 |
|-----------|-------------------------------------|---|

*Prescribed Courses: Require a grade of C or better*

|           |   |   |
|-----------|---|---|
| CMPSC 221 | Object Oriented Programming with Web-Based Applications | 3 |
| CMPSC 360 | Discrete Mathematics for Computer Science               | 3 |
| CMPSC 442 | Artificial Intelligence                                 | 3 |
| CMPSC 455 | Introduction to Numerical Analysis I                    | 3 |
| CMPSC 465 | Data Structures and Algorithms                          | 3 |
| DS 410    | Programming Models for Big Data                         | 3 |
| MATH 230  | Calculus and Vector Analysis                            | 4 |

|          |   |   |
|----------|---|---|
| STAT 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**<sup>1</sup>

|   |   |
|---|---|
| Select 6 credits from Applied Option List A in Appendix D | 6 |
|---|---|

|   |   |
|---|---|
| Select 6 credits from Applied Option List B in Appendix D | 6 |
|---|---|

<sup>1</sup> 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): 35 credits****Only Available through the Eberly College of Science**

| Code | Title | Credits |
|------|-------|---------|
|------|-------|---------|

**Prescribed Courses***Prescribed Courses: Require a grade of C or better*

|          |   |   |
|----------|---|---|
| MATH 230 | Calculus and Vector Analysis            | 4 |
| STAT 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 CMPSC 448 | Machine Learning and Algorithmic AI       |   |
| MATH 311W    | Concepts of Discrete Mathematics          | 3 |
| or CMPSC 360 | Discrete Mathematics for Computer Science |   |

**Supporting Courses and Related Areas**<sup>1</sup>

|   |   |
|---|---|
| Select 6 credits from Quantitative Modeling Option List A courses, see Appendix D | 6 |
|---|---|

|   |   |
|---|---|
| Select 6 credits from Quantitative Modeling Option List B courses, see Appendix D | 6 |
|---|---|

<sup>1</sup> 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/#suggestedacademicplantext>)