Data Science, BS (CS)

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About the Program

Majoring in data science at Purdue will place you at the forefront of an emerging field and prepare you for an exciting career at the intersection of computer science and statistics.

Created jointly by Purdue's Department of Computer Science and Department of Statistics, the data science major will open pathways to careers in virtually every area of society, from healthcare, security and sustainability to education, business and economics.

Curriculum and Degree Requirements for College of Science

A College of Science degree is conferred when a student successfully completes all requirements in their degree program. Students will complete coursework or approved experiential learning activities to meet the following three degree components:

1. Major
2. Science Core Curriculum

3. Electives

Students may use any of the following options to meet College of Science degree requirements:

- Purdue Coursework
- AP, IB, and CLEP credit. The use of AP and IB coursework varies between College of Science degree plans.
- Transfer Credit. Students should consult the Admissions Transfer Credit Resource page for all available transfer options.

College of Science degree programs vary widely in their approval and use of the proceeding options and thus students are strongly encouraged to work closely with their academic advisors and to regularly consult their MyPurduePlan to view the use of each option in their degree plan.

Most College of Science degree programs contain elective credits students may use to pursue courses that relate to their interests or which support their major area of study. The elective area of a degree plan may also be used to complete minors, second majors and certificates such as the Entrepreneurial Certificate. With the exception of courses on the No Count List, any Purdue course may be used to meet the elective area of a student's degree plan.

College of Science Core Requirements

All Students starting Purdue University Fall semester, 2007 or later are required to pursue the 2007 Science Core curriculum.

The College of Science Core Curriculum requires the completion of approved coursework and/or experiential learning

opportunities in the following academic areas:

- Composition and Presentation
- Computing
- Cultural Diversity (Language and Culture)
- General Education
- Great Issues in Science
- Laboratory Science
- Mathematics
- Science Technology and Society
- Statistics
- Teambuilding and Collaboration
- No Count List

Earning Core Curricular Requirements through Experience

Students may meet selected core curriculum requirements through approved experiential learning opportunities. Interested students should contact their academic advisor for more information on this option and incorporating experiential learning into their four-year program of study. For more information on earning requirements through experience, please click here.

Degree Requirements

120 Credits Required

Data Science Major Courses (47-51 credits)

- CS 18000 - Problem Solving And Object-Oriented Programming ♦ *(satisfies Computing, and Team-Building and Collaboration, for College of Science core)*
- CS 18200 - Foundations Of Computer Science
- CS 25100 - Data Structures And

Algorithms
- CS 37300 - Data Mining And Machine Learning
- CS 38003 - Python Programming
- CS 44000 - Large Scale Data Analytics
- MA 35100 - Elementary Linear Algebra
- STAT 35500 - Statistics For Data Science *(satisfies Statistics for College of Science core)*
- STAT 41600 - Probability
- STAT 41700 - Statistical Theory

- CS 24200 - Introduction To Data Science or
- STAT 24200 - Introduction To Data Science

- MA 26100 - Multivariate Calculus or
- MA 27101 - Honors Multivariate Calculus

Ethics Selective (3 credits)

Choose one.

- ILS 23000 - Data Science And Society: Ethical Legal Social Issues *(satisfies 3.0 credits of GE for College of Science core)*
- PHIL 20700 - Ethics For Technology, Engineering, And Design *(satisfies Multidisciplinary Experience and 3.0 credits of GE for College of Science core)*
- PHIL 20800 - Ethics Of Data Science *(must be 3.00 Credit Hour option; satisfies Multidisciplinary Experience and 3.0 credits of GE for College of Science core)*

CS Selectives (6 credits)

Choose two.

- CS 31400 - Numerical Methods
- CS 35500 - Introduction To Cryptography
- CS 43900 - Introduction To Data Visualization
- CS 47100 - Introduction to Artificial Intelligence
- CS 47300 - Web Information Search And Management
- CS 47500 - Human-Computer Interaction

- CS 30700 - Software Engineering I or
- CS 40800 - Software Testing

- CS 34800 - Information Systems or
- CS 44800 - Introduction To Relational Database Systems

- CS 38100 - Introduction To The Analysis Of Algorithms or
- CS 48300 - Introduction To The Theory Of Computation

Statistics Selective (3 credits)

Choose one.

- MA 43200 - Elementary Stochastic Processes
- STAT 42000 - Introduction To Time Series
- STAT 50600 - Statistical Programming And Data Management

- STAT 51200 - Applied Regression Analysis
- STAT 51300 - Statistical Quality Control
- STAT 51400 - Design Of Experiments
- STAT 52200 - Sampling And Survey Techniques
- STAT 52500 - Intermediate Statistical Methodology

Capstone Experience (3 credits)

CS 37300 must be completed with a grade of C or better prior to the start of the Capstone Experience.

Choose one option below.

Credit Course Options

- CS 49000 - DSC–Data Science Capstone - DSC Section only - RECOMMENDED OPTION
- CS 49000 - Topics In Computer Science For Undergraduates (Individual Study) - a preapproved unpaid research opportunity in Data Science fulfills the capstone.
- *STAT 49000 and Data Mine projects/courses do not fulfill the Capstone requirement.*

Zero Credit Option

Students choosing a Zero-Credit Capstone

Experience Option must complete an additional selective from either the CS Selectives or the Statistics Selectives lists.

- CS 49000 - Topics In Computer Sciences For Undergraduates – (Individual Study) - a preapproved paid research opportunity in Data Science fulfills the capstone.
- An approved paid research opportunity in Data Science fulfills the capstone.
- STAT 49000 and Data Mine projects/courses do not fulfill the Capstone requirement.

Other Departmental/Program Course Requirements (29-52 credits)

COLLEGE OF SCIENCE CORE REQUIREMENTS

^ - Labeled as a Science Core Selection in the four year plan of study

* - Requirement may be met with a zero credit experiential learning option. See your advisor for more information.

Composition & Presentation

Written Communication

Choose one course

from the Written Communication list here. (satisfies Written Communication and Information Literacy for core)

Technical Writing And Presentation* (0 or 3 credits)

Students may elect to take one course (COM 21700), a combination of courses, or experiences to meet the TWTP requirement. The list of approved courses and experiences can be found **here** (ADD LINK IN ACALOG). (satisfies OC for core)

Special Note: Students completing both COM 11400 (elective) and COM 21700 (Technical Writing and Presentation requirement) may use both courses to meet degree requirements.

*Students wishing to meet the Technical Presentation and/or Technical Writing requirement through experience are required to complete the Experiential Learning Contract process.

International Students Only: International students whose primary high school/equivalent instruction was not in English may meet this requirement with a

course option only.

Computing

Met with required major coursework.

Cultural Diversity (Language & Culture)^* (0-9 credits)

Choose courses from this list to fulfill each Option below (select courses COULD satisfy Humanities for core).

- Language & Culture Option I
- Language & Culture Option II
- Language & Culture Option III

General Education^ (6 credits)

Choose courses from this list to fulfill each Option below (select courses COULD satisfy Behavioral/Social Science for core).

- General Education Option I (*Met with required major coursework)*
- General Education Option II
- General Education Option III

Great Issues In Science (3 credits)

Choose one from this list.

Laboratory Science (6-8 credits)

Choose courses from this list to fulfill each Option below (*satisfies Science for core*).

- Laboratory Science Option I
- Laboratory Science Option II

Mathematics (8-10 credits)

(satisfies Quantitative Reasoning for core)

- MA 16100 - Plane Analytic Geometry And Calculus I (must have C or better to meet prerequisite for CS 18200) or
- MA 16500 - Analytic Geometry And Calculus I (must have C or better to meet prerequisite for CS 18200)

- MA 16200 - Plane Analytic Geometry And Calculus II or
- MA 16600 - Analytic Geometry And Calculus II (must have C or better to meet pre-requisite for STAT 35500)

Science Technology & Society^* (0-3 credits)

Choose one from the Science Technology and Society list here, excluding those on the College of Science No Count list (satisfies STS for core).

Statistics

Met with required major coursework.

Team-Building and Collaboration

Met with required major coursework.

Electives (17-44 credits)

Enrollment in freshman seminar course *CS 19300 - Tools is required with* CS 18000*. It is not a degree requirement.*

Grade Requirements

- CS 37300 must be completed with a grade of C or better prior to the start of the Capstone Experience.
- *For this degree, all major required courses, all major electives (selectives), and their pre-requisites, regardless of department, must be completed with a grade of C or better.

GPA Requirements

- 2.0 Major and Graduation GPA required for Bachelor of Science degree.

College of Science Pass/No Pass Option Policy

- Only free electives and courses at the 50000-level general education requirement may be taken under the pass/not-pass option.
- The pass/not-pass grade mode may be entered for courses which are not required by a student's major(s), minor(s) or science core curriculum.
- Grade mode Passing is equivalent to at a minimum grade of C-

had a letter grade been awarded.

- Students may elect to use the pass/not-pass option for no more than 20% of the 124/120 credit requirement for graduation and for no more than two courses per academic year (Fall-Summer).
- The pass/not-pass option cannot be elected for a course that has already been completed with a letter grade. University Regulation.
- Students may take elective credit while abroad using the P/NP mode. In the case of universities which only post P/NP, the University will apply a calculation process to determine a letter grade.
- Department of Languages and Cultures P/NP policy and Language Placement results. Students must take advanced coursework for a letter grade to receive credit for lower-level language courses.

College of Science Transfer Credit Policy

College of Science degree programs vary widely in their approval and use of non-Purdue originated credit (AP, IB, CLEP, and transfer credit). Students work closely with their academic advisors and degree plan audits to review the use and approval of each non-Purdue credit option.

Computer Science Transfer Credit Policy

- Equivalent 10000 and 20000-level Computer Science (CS) transfer credit courses (including credit from regional campuses) may be used to meet degree requirements if those courses were taken prior to admission to the Purdue West Lafayette Data Science, B.S. CS program.
- CS transfer credit at the 30000-40000-level may not be used to meet degree requirements. As exception to this policy is the application of pre-approved Study Abroad coursework.

University Requirements

University Core Requirements

For a complete listing of University Core Course Selectives, visit the Provost's Website.

- Human Cultures: Behavioral/Social Science (BSS)
- Human Cultures: Humanities (HUM)
- Information Literacy (IL)
- Oral Communication (OC)
- Quantitative Reasoning (QR)
- Science #1 (SCI)
- Science #2 (SCI)
- Science, Technology, and Society (STS)
- Written Communication (WC)

Civics Literacy Proficiency Requirement

The Civics Literacy Proficiency activities are designed to develop civic knowledge of Purdue students in an

effort to graduate a more informed citizenry. For more information visit the Civics Literacy Proficiency **website.**

Students will complete the Proficiency by passing a test of civic knowledge, and completing one of three paths:

- Attending six approved civics-related events and completing an assessment for each; or
- Completing 12 podcasts created by the Purdue Center for C-SPAN Scholarship and Engagement that use C-SPAN material and completing an assessment for each; or
- Earning a passing grade for one of **these approved courses** (or transferring in approved AP or departmental credit in lieu of taking a course).

Upper Level Requirement

- Resident study at Purdue University for at least two semesters and the enrollment in and completion of at least 32 semester hours of coursework required and approved for the completion of the degree. These courses are expected to be at least junior-level (30000+) courses.
- Students should be able to fulfill *most*, *if not all*, of these credits within their major requirements; there should be a clear pathway for

students to complete any credits not completed within their major.

Sample 4-Year Plan

Fall 1st Year

- CS 18000 - Problem Solving And Object-Oriented Programming ♦ *

- MA 16100 - Plane Analytic Geometry And Calculus I or
- MA 16500 - Analytic Geometry And Calculus I

- Science Core Selection - Credit Hours: 3.00 - 4.00
- Elective - Credit Hour: 1.00 (CS 19300 strongly recommended)
- Elective - Credit Hour: 1.00
- Electives - Credit Hours: 3.00

16-18 Credits

Spring 1st Year

- CS 18200 - Foundations Of Computer Science *
- CS 38003 - Python Programming

- MA 16200 - Plane Analytic Geometry And Calculus II or
- MA 16600 - Analytic Geometry And Calculus II

- Science Core First Year Composition Selection - Credit Hours: 3.00 - 4.00
- Science Core Selection - Credit Hours: 3.00 - 4.00

- Electives - Credit Hours: 1.00

15-18 Credits

Fall 2nd Year

- STAT 35500 - Statistics For Data Science

- CS 24200 - Introduction To Data Science or
- STAT 24200 - Introduction To Data Science

- MA 26100 - Multivariate Calculus or
- MA 27101 - Honors Multivariate Calculus

- Science Core Selection - Credit Hours: 3.00 - 4.00
- Elective - Credit Hours: 1.00 - 3.00

14-18 Credits

Spring 2nd Year

- CS 25100 - Data Structures And Algorithms
- MA 35100 - Elementary Linear Algebra
- STAT 41600 - Probability
- Ethics Selective♦ - Credit Hours: 3.00
- Science Core Selection - Credit Hours: 3.00 - 4.00
- Elective - Credit Hours: 1.00 - 2.00

16-18 Credits

Fall 3rd Year

- CS 37300 - Data Mining And Machine Learning
- STAT 41700 -

Statistical Theory
- COM 21700 - Science Writing And Presentation
- Science Core Selection - Credit Hours: 3.00 - 4.00
- Elective - Credit Hours: 3.00

15-16 Credits

Spring 3rd Year

- CS Selective - Credit Hours 3.00
- Statistics Selective - Credit Hours: 3.00
- Science Core Selection - Credit Hours: 3.00 - 4.00
- Science Core Selection - Credit Hours: 3.00 - 4.00
- Elective - Credit Hours: 3.00

15-17 Credits

Fall 4th Year

- CS 44000 - Large Scale Data Analytics
- CS Selective - Credit Hours: 3.00
- Science Core Selection - Credit Hours: 3.00 - 4.00
- Elective - Credit Hours: 3.00
- Elective - Credit Hours: 3.00
- Elective - Credit Hours: 1.00 - 3.00

16-17 Credits

Spring 4th Year

- Capstone Experience/Course - Credit Hours: 0.00 - 3.00
- Science Core Selection - Credit Hours: 3.00 - 4.00
- Science Core Selection - Credit Hours: 3.00 - 4.00

- Elective - Credit Hours: 3.00
- Elective - Credit Hours: 3.00
- Elective - Credit Hours: 1.00

13-18 Credits

Pre-Requisite Information

For pre-requisite information, click here.

World Language Courses

World Language proficiency requirements vary by program. The following list is inclusive of all world languages PWL offers for credit; for acceptable languages and proficiency levels, see your advisor. (ASL-American Sign Language; ARAB-Arabic; CHNS-Chinese; FR-French; GER-German; GREK-Greek(Ancient); HEBR-Hebrew(Biblical); HEBR-Hebrew(Modern); ITAL-Italian; JPNS-Japenese; KOR-Korean; LATN-Latin; PTGS=Portuguese; RUSS-Russian; SPAN-Spanish)

Critical Course

The ♦ course is considered critical.

In alignment with the Degree Map Guidance for Indiana's Public Colleges and Universities, published by the Commission for Higher Education (pursuant to HEA 1348-2013), a Critical Course is identified as "one that a student

must be able to pass to persist and succeed in a particular major. Students who want to be nurses, for example, should know that they are expected to be proficient in courses like biology in order to be successful. These would be identified by the institutions for each degree program".

Disclaimer

The student is ultimately responsible for knowing and completing all degree requirements.

Consultation with an advisor may result in an altered plan customized for an individual student.

The myPurduePlan powered by DegreeWorks is the knowledge source for specific requirements and completion.

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