DATA SCIENCE, B.S.

The Saint Louis University Bachelor of Science in Data Science is an interdisciplinary program supported by the Department of Computer Science (http://cs.slu.edu/) and the Department of Mathematics and Statistics (http://mathstat.slu.edu/). The curriculum is modeled upon guidelines for undergraduate programs in data science as endorsed by the American Statistical Association’s Board of Directors. Classes are small and are taught by enthusiastic instructors.

Leadership
Darrin Speegle, Ph.D.
Program Director

Curriculum Overview
The B.S. in Data Science is among the most rigorous degrees offered at SLU. This program combines carefully selected computer science, statistics and mathematics courses with four semesters of practica and capstone experiences. The result is an education that is rooted in the fundamentals, but also provides hands-on experience with cleaning, visualizing, analyzing and reporting on data. Students choose electives within the major to specialize more in the computer science or statistical aspects of data science.

Fieldwork and Research Opportunities
Faculty in the data science program do research in machine learning, natural language processing, time series, topological data analysis, and in other areas of statistics, computer science and mathematics.

There are multiple research, internship and consulting opportunities for students in the data science program. Some students have done cross-disciplinary work with ArchCity Defenders, the Department of Sociology, the Department of Languages, Literature and Cultures, the Department of English, the Medical School Liver Center, while others have done work in data science itself doing research with faculty within the Departments of Mathematics and Statistics, the Department of Computer Science and the Lincoln Lab at MIT, among others.

The SLU Data Science Club provides students with an opportunity to practice their predictive modeling in competitions. Some competitions are hosted locally by SLU solely for students at SLU, while some competitions will pit SLU students against students and professionals from across the world.

Careers
The McKinsey Report estimated that the United States would face a shortfall of between 140-190 thousand people with deep analytical skills, while also needing 1.5 million managers and analysts with the know-how to make decisions based on the analysis of big data.

The Harvard Business Review calls data scientist ‘the sexiest job of the 21st century,’ and each year from 2016-2018, Glassdoor has ranked data scientist as the No. 1 overall job in the USA in terms of the number of job openings, earning potential and career opportunities rating. Data is being produced in many places, and companies need employees who can analyze the data and communicate about the results. Students with a B.S. in data science will be well positioned to work in technology, government, research and consulting fields, among others.

Admission Requirements
Freshman
Begin your application for this program at www.slu.edu/apply (http://www.slu.edu/apply.php). Saint Louis University also accepts the Common App.

All applications are thoroughly reviewed with the highest degree of individual care and consideration to all credentials that are submitted. Solid academic performance in college preparatory course work is a primary concern in reviewing a freshman applicant’s file.

To be considered for admission to any Saint Louis University undergraduate program, the applicant must be graduating from an accredited high school, have an acceptable HIGET exam score or take the General Education Development (GED) test. Beginning with the 2021-22 academic year, undergraduate applicants will not be required to submit standardized test scores (ACT or SAT) in order to be considered for admission. Applicants will be evaluated equally, with or without submitted test scores.

Begin Your Application (http://www.slu.edu/apply.php)

Transfer
Begin your application for this program at www.slu.edu/apply (http://www.slu.edu/apply.php).

Applicants must be a graduate of an accredited high school or have an acceptable score on the GED. An official high school transcript and official test scores are required only of those students who have attempted fewer than 24 transferable semester credits (or 30 quarter credits) of college credit. Those having completed 24 or more of college credit need only submit a transcript from previously attended college(s). In reviewing a transfer applicant’s file, the office of admission holistically examines the student’s academic performance in college-level coursework as an indicator of the student’s ability to meet the academic rigors of Saint Louis University.

International Applicants
Begin your application for this program at www.slu.edu/apply (http://www.slu.edu/apply.php).

All admission policies and requirements for domestic students apply to international students along with the following:

- Demonstrate English Language Proficiency (http://catalog.slu.eduacademic-policies/office-admission/undergraduate/english-language-proficiency/)
- Proof of financial support must include:
  - A letter of financial support from the person(s) or sponsoring agency funding the time at Saint Louis University
  - A letter from the sponsor’s bank verifying that the funds are available and will be so for the duration of study at the University
- Academic records, in English translation, of students who have undertaken postsecondary studies outside the United States must include the courses taken and/or lectures attended, practical laboratory work, the maximum and minimum grades attainable, the grades earned or the results of all end-of-term examinations, and any honors or degrees received. WES and ECE transcripts are accepted.
Scholarships and Financial Aid

There are two principal ways to help finance a Saint Louis University education:

• **Scholarships**: Awarded based on academic achievement, service, leadership and financial need.
• **Financial Aid**: Provided in the form of grants and loans, some of which require repayment.

For priority consideration for merit-based scholarships, apply for admission by Dec. 1 and complete a Free Application for Federal Student Aid (FAFSA) by March 1.

For information on other scholarships and financial aid, visit the student financial services office online at https://www.slu.edu/financial-aid/.

Learning Outcomes

1. Graduates will be able to use programming and other computer science skills to analyze and interact with data,
2. Graduates will be able to apply statistics to analyze data sets,
3. Graduates will be able to acquire and manage complex data sets,
4. Graduates will be able to use technical skills in predictive modeling,
5. Graduates will be able to visualize data to facilitate the effective presentation of data-driven insights.

Requirements

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td></td>
<td><strong>Core Requirement</strong></td>
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<tr>
<td></td>
<td>College core requirements (p. 2)</td>
<td>54-63</td>
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</table>

For additional information about core courses (http://catalog.slu.edu/colleges-schools/arts-sciences/#coretext)

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSCI 1070</td>
<td>Introduction to Computer Science: Taming Big Data</td>
<td>3</td>
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<tr>
<td>CSCI 1300</td>
<td>Introduction to Object-Oriented Programming</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2100</td>
<td>Data Structures</td>
<td>4</td>
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<tr>
<td>CSCI 2300</td>
<td>Object-Oriented Software Design</td>
<td>3</td>
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<tr>
<td>CSCI 3710</td>
<td>Databases</td>
<td>3</td>
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<tr>
<td>CSCI 4750</td>
<td>Machine Learning</td>
<td>3</td>
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<tr>
<td>MATH 1510</td>
<td>Calculus I (also fulfills A&amp;S core 4-credit Math requirement)</td>
<td>4</td>
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<tr>
<td>MATH 1520</td>
<td>Calculus II</td>
<td>4</td>
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<tr>
<td>MATH 1660</td>
<td>Discrete Mathematics</td>
<td>3</td>
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<tr>
<td>MATH 2530</td>
<td>Calculus III</td>
<td>4</td>
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<tr>
<td>MATH 3110</td>
<td>Linear Algebra for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 3120</td>
<td>Introduction to Linear Algebra</td>
<td></td>
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<tr>
<td>STAT 3850</td>
<td>Foundation of Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 4870</td>
<td>Applied Regression</td>
<td>3</td>
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<tr>
<td>STAT 4880</td>
<td>Bayesian Statistics and Statistical Computing</td>
<td>3</td>
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<tr>
<td>DATA 1800</td>
<td>Data Science Practicum I</td>
<td>1</td>
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<tr>
<td>DATA 2800</td>
<td>Data Science Practicum II</td>
<td>1</td>
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<tr>
<td>DATA 4961</td>
<td>Capstone Project I</td>
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**Data Science Integration Requirements**

**Bachelor of Science Core Curriculum Requirements**

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<th>Code</th>
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<tr>
<td>DATA 4962</td>
<td>Capstone Project II</td>
<td>2</td>
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**Major Electives**

Select three courses, must include at least once CSCI course and at least one STAT course, from the following:

- CSCI 3100 | Algorithms
- CSCI 3300 | Software Engineering
- CSCI 4850 | High-Performance Computing
- STAT 4800 | Probability Theory
- STAT 4840 | Time Series
- STAT 4850 | Mathematical Statistics

Total Credits: 121

**Continuation Standards**

Students must have a minimum of a 2.00 cumulative GPA in data science major courses by the conclusion of their sophomore year, must maintain a minimum of 2.00 cumulative GPA in these courses at the conclusion of each semester thereafter, and must be registered in at least one data science course counting toward their major in each academic year (until all requirements are completed).

**Graduation Requirements**

• Complete a minimum of 120 credits (excluding pre-college level courses [numbered below 1000]).
• Complete either the College of Arts and Sciences Bachelor of Arts or Bachelor of Science Core Curriculum Requirements
• Complete Major Requirements: minimum 30 credits required.

For information on other scholarships and financial aid, visit the student financial services office online at https://www.slu.edu/financial-aid/.
• Complete remaining credits with a second major, minor, certificate, and/or elective credits to reach the minimum of 120 credits required for graduation.
• Achieve at least a 2.00 cumulative grade point average, a 2.00 grade point average in the major(s) and a 2.00 grade point average in the minor/certificate, or related elective credits.
• Complete department/program-specific academic and performance requirements.
• Complete at least 50% of the coursework for the major and 75% for the minor/certificate through Saint Louis University or an approved study abroad program.
• Complete 30 of the final 36 credits through Saint Louis University or an approved study abroad program.
• Complete an online degree application by the required University deadline.

Roadmap

Roadmaps are recommended semester-by-semester plans of study for programs and assume full-time enrollment unless otherwise noted.

Courses and milestones designated as critical (marked with !) must be completed in the semester listed to ensure a timely graduation. Transfer credit may change the roadmap.

This roadmap should not be used in the place of regular academic advising appointments. All students are encouraged to meet with their advisor/mentor each semester. Requirements, course availability and sequencing are subject to change.

Course | Title | Credits
--- | --- | ---
Year One |  |  
Fall | CSCI 1070 | Introduction to Computer Science: Taming Big Data † | 3
Fall | MATH 1510 | Calculus I † | 4
Fall | MATH 1660 | Discrete Mathematics | 3
Fall | UNIV 1010 | Enhancing First-Year Success | 1
Fall | A&S Core | English | 3

Spring |  |  
Spring | CSCI 1300 | Introduction to Object-Oriented Programming † | 4
Spring | MATH 1520 | Calculus II † | 4
Spring | DATA 1800 | Data Science Practicum I † | 1
Fall | A&S Core | Theology | 3
Fall | A&S Core | Philosophy (Ethics) | 3

Year Two |  |  
Fall | CSCI 2100 | Data Structures ‡ | 4
Fall | MATH 2530 | Calculus III | 4
Core | Science I with lab | 4
Core | Foreign Language | 3

Interdepartmental |  |  
Core | Foreign Language II | 3

Spring |  |  
Spring | STAT 3850 | Foundation of Statistics | 3

† Students must earn a C- or better.
‡ Strongly recommended for capstone

Program Notes

Data Structures (CSCI 2100) and Foundation of Statistics (STAT 3850) are the two crucial courses to the degree path. Data Structures (CSCI 2100) is a prerequisite for all further study in computer science for this major; some courses have additional prerequisites. Foundation of Statistics (STAT 3850) is a prerequisite for all further study in statistics; some courses may have additional prerequisites. The courses required for Data Structures (CSCI 2100) are: Introduction to Computer Science: Taming Big Data (CSCI 1070), Introduction to Object-Oriented Programming (CSCI 1300) and Discrete Mathematics (MATH 1660). The courses required for Foundation of Statistics (STAT 3850) are: Calculus
I (MATH 1510) and Calculus II (MATH 1520). Other potential roadblocks are:

1. Data Science Practicum I (DATA 1800) must be completed by Spring one year before the student wishes to graduate. It is a prerequisite for Data Science Practicum II (DATA 2800), offered in Spring.
2. Linear Algebra for Engineers (MATH 3110) (recommended) and Calculus III (MATH 2530) (required) should be completed before Machine Learning (CSCI 4750) and Applied Regression (STAT 4870).