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. Past 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 others 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

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

Saint Louis University also accepts the Common Application.

Freshman

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 coursework is a primary concern in reviewing a freshman applicant’s file.

To be considered for admission to any Saint Louis University undergraduate program, applicants must be graduating from an accredited high school, have an acceptable HiSET exam score or take the General Education Development (GED) test.

Transfer

Applicants must be a graduate of an accredited high school or have an acceptable score on the GED.

Students who have attempted fewer than 24 semester credits (or 30 quarter credits) of college credit must follow the above freshmen admission requirements. Students who have completed 24 or more semester credits (or 30 quarter credits) of college credit must submit transcripts from all 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 rigor of Saint Louis University. Where applicable, transfer students will be evaluated on any courses outlined in the continuation standards of their preferred major.

International Applicants

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

- Demonstrate 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: Scholarships are awarded based on academic achievement, service, leadership and financial need.
- Financial Aid: Financial aid is 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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<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>
</tr>
<tr>
<td>CSCI 2300</td>
<td>Object-Oriented Software Design</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 4710</td>
<td>Databases</td>
<td>3</td>
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<tr>
<td>CSCI 4750</td>
<td>Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1510</td>
<td>Calculus I (also fulfills A&amp;S core 4-credit Math requirement)†</td>
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</tr>
<tr>
<td>MATH 2530</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<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>
</tr>
<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>
</tr>
<tr>
<td>DATA 1800</td>
<td>Data Science Practicum I</td>
<td>1</td>
</tr>
<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>
<td>2</td>
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<tr>
<td>DATA 4962</td>
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<tr>
<td>CSCI 3100</td>
<td>Algorithms</td>
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<tr>
<td>CSCI 3300</td>
<td>Software Engineering</td>
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<tr>
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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).

Bachelor of Science Core Curriculum Requirements

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<td>STAT 4840</td>
<td>Time Series</td>
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</table>

Total Credits: 54-60

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.
- • Complete remaining credits with a second major, minor, certificate, and/or electives 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
- MATH 1510 Calculus I † 4
- MATH 1660 Discrete Mathematics 3
- UNIV 1010 Enhancing First-Year Success 1
  - A&S Core English 3
  - Credits 14

**Spring**
- CSCI 1300 Introduction to Object-Oriented Programming † 4
- MATH 1520 Calculus II † 4
- DATA 1800 Data Science Practicum I † 1
  - A&S Core Theology 3
  - A&S Core Philosophy (Ethics) 3
  - Credits 15

#### Year Two

**Fall**
- CSCI 2100 Data Structures † 4
- MATH 2530 Calculus III 4
  - Core Science I with lab 4
  - Core Foreign Language 3
  - Credits 15

**Spring**
- STAT 3850 Foundation of Statistics 3
  - ! DATA 2800 Data Science Practicum II † 1
- CSCI 2300 Object-Oriented Software Design 3
- MATH 3110 Linear Algebra for Engineers 3
  - Core Science II with lab 4
  - Core Foreign Language II 3
  - Credits 17

#### Year Three

**Fall**
- CSCI 4710 Databases 3
- STAT 4870 Bayesian Statistics and Statistical Computing 3
- PHIL 3410 Computer Ethics 3
  - Core History 3
  - Credits 17

**Spring**
- STAT 4850 Machine Learning † 3
- STAT 4870 Applied Regression ‡ 3
  - Core Fine and Performing Arts 3
  - Core History 3
  - Core Social Science 3
  - Credits 15

#### Year Four

**Fall**
- DATA 4961 Capstone Project I 2
- CSCI/STAT Elective 3
  - CSCI/STAT Elective 3
  - Core Literature 3
  - Core Theology 2xxx 3
  - General Elective 3
  - Credits 17

**Spring**
- DATA 4962 Capstone Project II 2
- CSCI/STAT Elective 3
  - Core Global Citizenship 3
  - Core Cultural Diversity in the US 3
  - General Elective 3
  - Credits 14

Total Credits 122

† 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).