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 and 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 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 (https://catalog.slu.edu/academic-policies/office-admission/undergraduate/english-language-proficiency/)
- Proof of financial support must include:
  - 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
  - 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.

Tuition

<table>
<thead>
<tr>
<th>Tuition</th>
<th>Cost Per Year</th>
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</thead>
<tbody>
<tr>
<td>Undergraduate Tuition</td>
<td>$52,260</td>
</tr>
</tbody>
</table>

Additional charges may apply. Other resources are listed below:

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 through grants and loans, some of which require repayment.

Saint Louis University makes every effort to keep our education affordable. In fiscal year 2022, 99% of first-time freshmen and 90% of all students received financial aid and students received more than $445 million in aid University-wide.

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

For information on other scholarships and financial aid, visit [www.slu.edu/financial-aid](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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 1070</td>
<td>Introduction to Computer Science: Taming Big Data</td>
<td>3</td>
</tr>
<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 4710</td>
<td>Databases</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 4750</td>
<td>Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1510</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1520</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1660</td>
<td>Discrete Mathematics</td>
<td>3</td>
</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>
</tr>
<tr>
<td>STAT 4880</td>
<td>Bayesian Statistics and Statistical Computing</td>
<td>3</td>
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Data Science Integration Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<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>
</tr>
<tr>
<td>DATA 4961</td>
<td>Capstone Project I</td>
<td>2</td>
</tr>
<tr>
<td>DATA 4962</td>
<td>Capstone Project II</td>
<td>2</td>
</tr>
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</table>

Major Electives 12

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CSCI 2300</td>
<td>Object-Oriented Software Design</td>
<td></td>
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<tr>
<td>CSCI 3100</td>
<td>Algorithms</td>
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<tr>
<td>CSCI 2500</td>
<td>Computer Organization and Systems</td>
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<tr>
<td>CSCI 3300</td>
<td>Software Engineering</td>
<td></td>
</tr>
<tr>
<td>CSCI 3500</td>
<td>Operating Systems</td>
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<tr>
<td>CSCI 4610</td>
<td>Concurrent and Parallel Programming</td>
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</tr>
<tr>
<td>CSCI 4620</td>
<td>Distributed Computing</td>
<td></td>
</tr>
<tr>
<td>CSCI 4740</td>
<td>Artificial Intelligence</td>
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<tr>
<td>CSCI 4760</td>
<td>Deep Learning</td>
<td></td>
</tr>
<tr>
<td>CSCI 4830</td>
<td>Computer Vision</td>
<td></td>
</tr>
<tr>
<td>CSCI 4845</td>
<td>Natural Language Processing</td>
<td></td>
</tr>
<tr>
<td>STAT 4800</td>
<td>Probability Theory</td>
<td></td>
</tr>
<tr>
<td>STAT 4840</td>
<td>Time Series</td>
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<tr>
<td>STAT 4850</td>
<td>Mathematical Statistics</td>
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</tr>
</tbody>
</table>

General Electives 24-27

Total Credits 120

Non-Course Requirements

All Science and Engineering B.A. and B.S. students must complete an exit interview/survey near the end of their bachelor’s program.

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).

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 1660 Discrete Mathematics 3
- MATH 1510 Calculus I (satisfies CORE 3200) ‡ † 4
- CORE 1000 Ignite First Year Seminar 2
- CORE 1500 Cura Personalis 1: Self in Community 1
- CORE 1900 Eloquentia Perfecta 1: Written and Visual Communication 3

**Credits** 16

**Spring**
- CSCI 1300 Introduction to Object-Oriented Programming † 4
- MATH 1520 Calculus II ‡ 4
- DATA 1800 Data Science Practicum I † 1
- CORE 1600 Ultimate Questions: Theology 3
- General Electives 3

**Credits** 15

#### Year Two

**Fall**
- CSCI 2100 Data Structures † 4
- MATH 2530 Calculus III 4
- CORE 1200 Eloquentia Perfecta 2: Oral and Visual Communication 3
- CORE 1700 Ultimate Questions: Philosophy 3

**Credits** 14

**Spring**
- STAT 3850 Foundation of Statistics 3
- DATA 2800 Data Science Practicum II 1
- CSCI Elective 3
- MATH 3110 Linear Algebra for Engineers 3
- CORE 2500 Cura Personalis 2: Self in Contemplation 0
- CORE 3800 Ways of Thinking: Natural and Applied Sciences 3
- General Electives 3

**Credits** 16

#### Year Three

**Fall**
- CSCI 4710 Databases 3
- STAT 4880 Bayesian Statistics and Statistical Computing 3
- CORE 2800 Eloquentia Perfecta 3: Creative Expression 3
- CORE 3400 Ways of Thinking: Aesthetics, History, and Culture 3
- General Elective 3

**Credits** 15

**Spring**
- STAT 4870 Applied Regression 3
- CSCI 4750 Machine Learning 3
- CORE 3600 Ways of Thinking: Social and Behavioral Sciences 3

### General Electives 6

#### Year Four

**Fall**
- DATA 4961 Capstone Project I 2
- CSCI/STAT Electives 6
- CORE 3500 Cura Personalis 3: Self in the World 1
- General Electives 6

**Credits** 15

**Spring**
- DATA 4962 Capstone Project II 2
- CSCI/STAT Elective 3
- General Electives 9

**Credits** 14

**Total Credits** 120

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

### Program Notes
- STAT 3850 Foundation of Statistics (3 cr) and CSCI 2100 Data Structures (4 cr) are crucial to this program, as they serve as prerequisites for all of the upper division STAT and CSCI courses. As such, they should be taken as soon as reasonably possible.
- Possible STAT electives include STAT 4840 Time Series (3 cr), MATH 4800 Probability Theory (3 cr) and STAT 4850 Mathematical Statistics (3 cr).
- Possible CSCI electives include CSCI 2300 Object-Oriented Software Design (3 cr), CSCI 3100 Algorithms (3 cr), CSCI 3300 Software Engineering (3 cr), CSCI 4610 Concurrent and Parallel Programming (3 cr), CSCI 4620 Distributed Computing (3 cr), CSCI 4740 Artificial Intelligence (3 cr), CSCI 4760 Deep Learning (3 cr), CSCI 4830 Computer Vision (3 cr), and CSCI 4845 Natural Language Processing (3 cr).
- At least one elective must have a STAT designator and at least two electives must have a CSCI designator.
- Twelve hours of CSCI/STAT electives are required.