ARTIFICIAL INTELLIGENCE, M.S.

Saint Louis University's master's program in artificial intelligence prepares students to apply artificial intelligence methods both efficiently and ethically in order to solve difficult problems and impact the well-being of society.

This graduate program provides students with a depth of knowledge regarding the models and technologies used to make advances in underlying artificial intelligence and machine learning. Through a partnership with faculty across the University, students may choose to apply these techniques in specialized areas of application such as:

- Autonomous systems
- Bioinformatics
- Data science
- Health outcomes
- Image processing
- Natural language processing

Curriculum Overview

Students in SLU’s artificial intelligence degree program engage in the theory of artificial intelligence (AI) and machine learning (ML) and in applying AI/ML in practice, including a culminating research thesis or team-based capstone project. Students also consider important questions regarding the impact of AI on society, implicit bias that may result from AI systems and the ethical development and deployment of technologies.

Fieldwork and Research Opportunities

From SLU’s location in the Midtown area of St. Louis, our students have access to a strong technology community, operations of many Fortune 500 companies and a vibrant startup community. This provides outstanding opportunities for summer internships, part-time work during the academic year and jobs after graduation.

Employers in St. Louis who show great interest in computer science students include Boeing, Centene, Citi, Deloitte, Enterprise, Express Scripts, KPMG, Maritz, MasterCard, Microsoft, Bayer and World Wide Technologies. Other graduates have worked for smaller companies or even started their own companies.

SLU’s campus is within walking distance of the Cortex Innovation Community (https://cortexstl.org/), a vibrant 200-acre (and growing) innovation hub and technology district. Cortex is home to SLU’s Research Innovation Group (https://www.slu.edu/research/faculty-resources/research-innovation-group/), which works on technology transfer and commercial partnerships. Cortex is also home to the weekly Venture Cafe (https://venturecafestl.org/), which is a great place for students to connect with members of the tech community in a friendly and informal setting. Also in downtown St. Louis is the T-REX Technology Entrepreneur Center (http://www.downtowntrex.org/), a co-working space and technology incubator.

Careers

Careers related to artificial intelligence and computer science are routinely found on various “best jobs” lists because of their wonderful combination of excellent pay, satisfying work-life balance, and personal reward in seeing the great impact that computing can have throughout society. As a sample of such listings:

- U.S. Bureau of Labor Statistics (https://www.bls.gov/ooh/fastest-growing.htm) lists data scientist as the occupation with the third-highest projected growth through 2032. Other computing jobs ranked in the top 20 include information security analyst (#5), software developer (#10), computer and information research scientists (#13).
- Glassdoor’s 50 Best Jobs in America (https://www.glassdoor.com/List/Best-Jobs-in-America-LST_KQ020.htm) list for 2022 named data scientist as #3 and machine learning engineer as #6. Other computing jobs in the top 25 include enterprise architect (#1), Java developer (#9), devops engineer (#4), information security engineer (#15), software engineer (#8), back-end engineer (#11), cloud engineer (#12) and UX designer (#24).

Admission Requirements

A bachelor's degree in a science, technology, engineering or math major (STEM) is typical. Most successful applicants have an undergraduate grade point average of 3.00 or better on a 4.00 scale. Applicants should have evidence of strong computational skills (generally through prior coursework in programming and data structures), as well as evidence of strong mathematical skills, (generally through prior coursework in calculus and statistics).

Application Requirements

- Transcript(s)
- One letter of recommendation is required; two more are optional
- Résumé
- Statement of professional goals
- GRE general scores recommended

Requirements for International Students

All admission policies and requirements for domestic students apply to international students. International students must also meet the following additional requirements:

- Demonstrate English Language Proficiency (https://catalog.slu.edu/academic-policies/office-admission/undergraduate/english-language-proficiency/)
- Financial documents are required to complete an application for admission and be reviewed for admission and merit scholarships.
- Proof of financial support that must include:
  - A letter of financial support from the person(s) or sponsoring agency funding the student’s 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 the student’s study at the University
- Academic records, in English translation, of students who have undertaken postsecondary studies outside the United States must include:
• 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
• Any honors or degrees received.

WES and ECE transcripts are accepted.

Application Deadlines
Applications for January admission must be completed by the preceding Nov. 1, while applications for August admission must be completed by June 1. Applicants seeking scholarships or graduate assistantships are encouraged to apply earlier.

Review Process
Applications will be reviewed as they are completed. A panel of faculty members from the Department of Computer Science will decide on acceptance, and all applicants will be evaluated for potential scholarships or assistantships.

Tuition

<table>
<thead>
<tr>
<th>Tuition</th>
<th>Total Program Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS Artificial Intelligence</td>
<td>$42,000</td>
</tr>
</tbody>
</table>

Additional charges may apply. Other resources are listed below:

- Information on Tuition and Fees ([https://catalog.slu.edu/academic-policies/student-financial-services/tuition/](https://catalog.slu.edu/academic-policies/student-financial-services/ tuition/))
- Information on Summer Tuition ([https://catalog.slu.edu/academic-policies/student-financial-services/ tuition-summer/](https://catalog.slu.edu/academic-policies/student-financial-services/tuition-summer/))

Scholarships, Assistantships and Financial Aid

The computer science department offers several forms of merit-based financial support for graduate students. These include possible tuition scholarships and graduate assistantships that may include full or partial tuition, health insurance and a stipend for living expenses in exchange for the assistant's contributions to the teaching or research mission of the department. Students may also seek their own scholarships from a variety of independent organizations that support graduate education in STEM fields.

For more information, contact the Office of Student Financial Services ([http://www.slu.edu/financial-aid/](http://www.slu.edu/financial-aid/)).

Learning Outcomes

1. Graduates will be able to select the most appropriate choice among artificial intelligence methods for solving a given problem.
2. Graduates will be able to design an experiment to evaluate the quality of a machine learning model and predict its accuracy in a solution environment.
3. Graduates will be able to apply techniques from artificial intelligence to solve complex problems in an application domain.
4. Graduates will be able to design and implement a software solution that meets a given set of computing requirements.
5. Graduates will be able to make informed and ethical decisions regarding the impact of artificial intelligence technologies.
6. Graduates will be able to assess literature and technical documents in the fields of artificial intelligence and machine learning.
7. Graduates will be able to effectively communicate methods and results to both professional and general audiences in both oral and written form.

Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 5030</td>
<td>Principles of Software Development</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5050</td>
<td>Computing and Society</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5740</td>
<td>Introduction to Artificial Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5750</td>
<td>Introduction to Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>Artificial Intelligence Foundations course (p. 2)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Artificial Intelligence Applications course (p. 2)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Artificial Intelligence Electives (p. 3)</td>
<td>6</td>
<td></td>
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Choose the non-thesis or thesis Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Non-thesis Option:</td>
<td>6</td>
</tr>
<tr>
<td>Additional Foundations or Applications course</td>
<td></td>
</tr>
<tr>
<td>CSCI 5961</td>
<td>Artificial Intelligence Capstone Project</td>
</tr>
<tr>
<td>Thesis Option:</td>
<td></td>
</tr>
<tr>
<td>CSCI 5990</td>
<td>Thesis Research</td>
</tr>
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</table>

Total Credits 30

Artificial Intelligence Foundations

These courses have a primary focus on techniques in artificial intelligence and/or machine learning that have wide application to a variety of domain areas. Students must take at least one such course. The full list of approved courses is maintained by the computer science department and includes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 5730</td>
<td>Evolutionary Computation</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5745</td>
<td>Advanced Techniques in Artificial Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5760</td>
<td>Deep Learning</td>
<td>3</td>
</tr>
<tr>
<td>STAT 5087</td>
<td>Applied Regression</td>
<td>3</td>
</tr>
<tr>
<td>STAT 5088</td>
<td>Bayesian Statistics and Statistical Computing</td>
<td>3</td>
</tr>
</tbody>
</table>

Artificial Intelligence Applications

These courses explore how tools or techniques from artificial intelligence are applied to solve problems in a specific domain area. Students must take at least one such course. The full list of approved courses is maintained by the computer science department and includes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCB 5350</td>
<td>Machine Learning in Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td>BME 5150</td>
<td>Brain Computer Interface</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5070</td>
<td>Algorithmic Fairness</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5570</td>
<td>Machine Learning for Networks</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5830</td>
<td>Computer Vision</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5845</td>
<td>Natural Language Processing</td>
<td>3</td>
</tr>
</tbody>
</table>
GIS 5092  Machine Learning for GIS and Remote Sensing  3
HDS 5330  Predictive Modeling and Machine Learning  3

Artificial Intelligence Supporting Courses
At supporting courses must serve one of three purposes:

1. Provide knowledge in a specific domain area that prepares students to apply artificial intelligence or machine learning to solve problems in that particular domain.
2. Provide richer foundational knowledge in a supporting area (e.g. algorithms, statistics) that prepares students to understand, enhance, or implement artificial intelligence techniques.
3. Provide exploration of the broader impacts of artificial intelligence.

Students may apply at most six credits of such courses to the degree.

The full list of approved courses is maintained by the computer science department and includes:

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCB 5200</td>
<td>Introduction Bioinformatics I</td>
<td>3</td>
</tr>
<tr>
<td>BCB 5250</td>
<td>Introduction Bioinformatics II</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5100</td>
<td>Algorithms</td>
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<tr>
<td>CSCI 5530</td>
<td>Computer Security</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5550</td>
<td>Computer Networks</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5610</td>
<td>Concurrent and Parallel Programming</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5620</td>
<td>Distributed Computing</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5710</td>
<td>Databases</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 5910</td>
<td>Internship with Industry</td>
<td>1-3</td>
</tr>
<tr>
<td>CSCI 5970</td>
<td>Research Topics</td>
<td>1-3</td>
</tr>
<tr>
<td>CSCI 5980</td>
<td>Graduate Reading Course</td>
<td>1-3</td>
</tr>
<tr>
<td>ECE 5153</td>
<td>Image Processing</td>
<td>3</td>
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<tr>
<td>ECE 5226</td>
<td>Mobile Robotics</td>
<td>3</td>
</tr>
<tr>
<td>LAW 8235</td>
<td>Information Privacy Law</td>
<td>2-3</td>
</tr>
<tr>
<td>PSY 5120</td>
<td>Memory &amp; Cognition</td>
<td>3</td>
</tr>
<tr>
<td>SOC 5670</td>
<td>Spatial Demography – Applied Spatial Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Artificial Intelligence Electives
The remaining electives can be taken from any of the foundations, applications or supporting categories.

Foundational Coursework
Students without a previous degree in Computer Science or a closely related field may be required to take additional courses to satisfy pre-requisites. Typically, this will not impact time to degree.

Non-Course Requirements
All graduate degree candidates must complete an exit survey with the department during their final semester.

Continuation Standards
Students must maintain a cumulative grade point average (GPA) of 3.00 in all graduate/professional courses.

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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</tr>
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<tbody>
<tr>
<td>Fall</td>
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<td></td>
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<tr>
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<td>Introduction to Machine Learning</td>
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</tr>
<tr>
<td></td>
<td><strong>Credits</strong></td>
<td><strong>9</strong></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
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<tr>
<td>CSCI 5050</td>
<td>Computing and Society</td>
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<td></td>
<td><strong>Credits</strong></td>
<td><strong>9</strong></td>
</tr>
<tr>
<td>Year Two</td>
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</tr>
<tr>
<td>Fall</td>
<td>Additional course in either Artificial Intelligence Foundations or Applications</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credits</strong></td>
<td><strong>6</strong></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSCI 5961</td>
<td>Artificial Intelligence Capstone Project</td>
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</tr>
<tr>
<td></td>
<td><strong>Credits</strong></td>
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<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td><strong>33</strong></td>
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</table>

Contact Us
For questions about admissions, applicants currently in the United States should contact graduate@slu.edu and applicants elsewhere should contact globalgrad@slu.edu.

For other questions about the program or curriculum, contact the computer science department at cs@slu.edu.