

# GEOGRAPHIC INFORMATION SCIENCE, M.S.

Saint Louis University's master's program in geographic information science addresses an increasing demand for professionals with geospatial science skills. It offers a combination of geospatial theory and practical training.

SLU's interdisciplinary Master of Science (M.S.) in Geographic Information Science (GIScience), also known as geospatial science, from the Earth, Atmospheric, and Geospatial Science, is offered in cooperation with the Department of Sociology and Anthropology (<https://www.slu.edu/arts-and-sciences/sociology-anthropology/>) and other departments that offer GIScience courses (e.g., Departments of Biology (<https://www.slu.edu/arts-and-sciences/biology/>) and Computer Science (<https://www.slu.edu/science-and-engineering/academics/computer-science/>)). The program combines geospatial theory and practical training in geographic information systems (GIS), remote sensing and global positioning system software. The program prepares students to become experts well qualified to meet the increasing demand for experts in geospatial analytics, imaging science, photogrammetry, spatial statistics, machine learning and artificial intelligence. As an interdisciplinary program, the M.S. in GIScience focuses on research to address environmental, social and economic issues.

Students apply GIS, remote sensing, geovisualization, spatial analysis and statistics, database management and GIS programming within natural science, social science and integrative human-environment domains using innovative technologies and software programs (e.g., ArcGIS, QGIS, ENVI+IDL, SARscape, Python, GeoDA, R).

## Curriculum Overview

Students in the program choose from the following completion options:

- A coursework-only, no-thesis option for students who do not plan to pursue a doctoral degree or academic career
- A coursework-plus-research-project option for students who wish to enhance their geospatial research skills in a particular area
- A coursework-plus-thesis option for students who plan to pursue a doctoral degree or academic career

Students who choose the coursework-only or the coursework-plus-research-project options can structure their coursework to complete the program in one year.

Other program highlights:

- Curriculum informed by the Geographic Information Science and Technology Body of Knowledge (GIS&T BoK),
- Late-afternoon or evening classes that accommodate working professionals
- Instructors with advanced degrees who work and conduct research in the field
- State-of-the-art research labs equipped with modern computing, commercial and open-source software tools, various remote-sensing sensors and manned and unmanned aircrafts

## Fieldwork and Research Opportunities

Department of Earth, Atmospheric, and Geospatial Science faculty work and conduct research in the field. They have won grants from

various institutions, including the National Aeronautics and Space Administration (NASA), U.S. Centers for Disease Control and Prevention, U.S. Environmental Protection Agency, Geological Society of America, National Geospatial Intelligence Agency, National Institutes of Health, National Park Service, National Science Foundation, U.S. Army Corps of Engineers, Electric Power Research Institute, Missouri Department of Natural Resources, Ameren and others.

## Careers

Graduates from SLU's GIS master's program have a very good employment outlook. Employment in this field is growing at an annual rate of almost 35%, with the commercial subsection of the market expanding by 100% each year, according to the Geospatial Information and Technology Association.

Recent graduates from this program have been employed by various environmental, remote sensing and GIS companies, including Bayer, the National Geospatial-Intelligence Agency and U.S. Geological Survey (USGS).

## Admission Requirements

### Application Requirements

- Application form
- Three letters of recommendation
- Transcript(s)
- Professional goal statement
- Résumé
- Test scores from the GMAT, LSAT, or GRE are not required but can be submitted to support the application

### 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/>)
- 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.
- In order to be issued an I-20 for your F-1 visa application, students must submit financial documents. 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

## Application and Assistantship Application Deadlines

The final deadline for fall admittance is May 1 for international students and Aug. 1 for domestic students. To be considered for assistantships, students should apply by Feb. 1.

## Review Process

Applications will be reviewed on a rolling basis as received.

## Tuition

Tuition	Cost Per Credit
Graduate Tuition	\$1,370

Additional charges may apply. Other resources are listed below:

Net Price Calculator (<https://www.slu.edu/financial-aid/tuition-and-costs/calculator.php>)

Information on Tuition and Fees (<https://catalog.slu.edu/academic-policies/student-financial-services/tuition/>)

Miscellaneous Fees (<https://catalog.slu.edu/academic-policies/student-financial-services/fees/>)

Information on Summer Tuition (<https://catalog.slu.edu/academic-policies/student-financial-services/tuition-summer/>)

## Scholarships, Assistantships and Financial Aid

For priority consideration for a graduate assistantship, apply by the program admission deadlines listed. Fellowships and assistantships provide a stipend and may include health insurance and a tuition scholarship for the duration of the award.

Explore Scholarships and Financial Aid Options (<https://www.slu.edu/financial-aid/>)

## Learning Outcomes

1. Graduates will be able to define geographic information science in terms of its key scientific themes and fields of application.
2. Graduates will be able to discuss how GIS and remote sensing are used to investigate problems related to sustainability and environmental science.
3. Graduates will be able to demonstrate effective written and oral communication skills needed to disseminate geographic information.
4. Graduates will be able to apply appropriate research design methods to address problems that are germane to the field of GIScience and applied geospatial analysis.
5. Graduates will be able to demonstrate practices and approaches for working effectively on team-based projects.
6. Graduates will be able to demonstrate effective cartographic/geovisualization skills employing principles of map design and graphic representation techniques.
7. Graduates will be able to demonstrate knowledge of geospatial data in terms of Earth geometry, georeferencing systems, map projections, data quality and metadata standards and practice.
8. Graduates will be able to compare and contrast different approaches to geospatial data modeling involving vector, raster or hybrid representations.

9. Graduates will be able to demonstrate the use of relational database management systems as applied to geospatial data.
10. Graduates will be able to apply geometric measurement techniques to quantify distance, direction, shape, area, proximity and connectivity of geospatial features.
11. Graduates will be able to apply basic analytical operations involving buffering, overlays and map algebra.
12. Graduates will be able to apply advanced analytical methods including point-pattern analysis, kernel-density estimation, spatial-cluster detection, network analysis and multicriteria evaluation.
13. Graduates will be able to apply surface analysis techniques to effectively represent continuous surfaces, calculate surface derivatives, analyze surface flow and analyze intervisibility.
14. Graduates will be able to apply spatial statistics and geostatistics involving measures of spatial autocorrelation and spatial interpolation techniques.
15. Graduates will be able to explain the principles of active and passive remote sensing observation.
16. Graduates will be able to describe and interpret remote sensing spectra and imagery.
17. Graduates will be able to perform supervised, unsupervised and object-based classification techniques using remote sensing data.
18. Graduates will be able to apply image processing techniques including radiometric correction, atmospheric correction, change detection, target detection and data fusion.

## Requirements

Code	Title	Credits
GIS 5010	Introduction to Geographic Information Systems	3
GIS 5030	Geospatial Data Management	3
GIS 5040	Introduction to Remote Sensing	3
GIS 5050	Digital Image Processing	3
GIS 5080	Digital Cartography and Geovisualization	3
GIS 5090	Introduction to Programming for GIS and Remote Sensing	3

### GIS Electives 12

*Select four from the following:*

**Thesis track students should take 6 credits of GIS 5990 Thesis Research to replace 6 credits of GIS Electives**

BIOL 5190	Geographic Information Systems in Biology
CSCI 5750	Introduction to Machine Learning
CSCI 5760	Deep Learning
CSCI 5830	Computer Vision
ECE 5153	Image Processing
GIS 5061	Photogrammetry
GIS 5091	Advanced Programming for GIS and Remote Sensing
GIS 5092	Machine Learning for GIS and Remote Sensing
GIS 5100	Microwave Remote Sensing: SAR Principles, Data Processing and Applications
GIS 5110	Interferometric Synthetic Aperture Radar (InSAR)
GIS 5120	Geospatial Analytics

GIS 5130	Human Geography
GIS 5140	Satellite Geodesy
GIS 5990	Thesis Research (Only for Thesis students, 6 hours required)
SOC 5640	Demographic Methods, Analysis, and Public Policy
SOC 5670	Spatial Demography – Applied Spatial Statistics
<b>Total Credits</b>	<b>30</b>

### Continuation Standards

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

### Thesis Track Requirements

Completion of 30 total credit-hours, with six credits (2 x 3 credit hours) of Thesis Research (GIS 5990) to be taken during year two. Thesis Research credits substitute for two of the GIS Electives above. Thesis Track students must also successfully complete a Master’s Prospectus/ Proposal, a Thesis, and Thesis Defense.

### 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.

### Full-time Student (One-Year)

Course	Title	Credits
<b>Year One</b>		
<b>Fall</b>		
GIS 5010	Introduction to Geographic Information Systems	3
GIS 5040	Introduction to Remote Sensing	3
GIS 5090	Introduction to Programming for GIS and Remote Sensing	3
GIS Elective		6
<b>Credits</b>		<b>15</b>
<b>Spring</b>		
GIS 5030	Geospatial Data Management	3
GIS 5080	Digital Cartography and Geovisualization	3
GIS 5050	Digital Image Processing	3
GIS Elective		6
<b>Credits</b>		<b>15</b>
<b>Total Credits</b>		<b>30</b>

### Part-time Student (Two-Years)

Course	Title	Credits
<b>Year One</b>		
<b>Fall</b>		
GIS 5010	Introduction to Geographic Information Systems	3
GIS 5090	Introduction to Programming for GIS and Remote Sensing	3
<b>Credits</b>		<b>6</b>
<b>Spring</b>		
GIS 5030	Geospatial Data Management	3
GIS 5080	Digital Cartography and Geovisualization	3
<b>Credits</b>		<b>6</b>
<b>Summer</b>		
GIS Elective		3
<b>Credits</b>		<b>3</b>
<b>Year Two</b>		
<b>Fall</b>		
GIS 5040	Introduction to Remote Sensing	3
GIS Elective		3
<b>Credits</b>		<b>6</b>
<b>Spring</b>		
GIS 5050	Digital Image Processing	3
GIS Elective		3
<b>Credits</b>		<b>6</b>
<b>Summer</b>		
GIS Elective		3
<b>Credits</b>		<b>3</b>
<b>Total Credits</b>		<b>30</b>

### Contact Us

For more information about our program, please contact:

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