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.

The interdisciplinary Master of Science (M.S.) in Geographic Information Science (GIScience), also known as Geospatial Science, from Department of Earth and Atmospheric Sciences at Saint Louis University, is offered in cooperation with Department of Sociology and Anthropology and other departments that offer GIScience courses (e.g., Department of Biology). 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 analysis. 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 three 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

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 and Atmospheric Sciences faculty work and conduct research in the field. They have been awarded grants from various institutions, including the National Aeronautics and Space Administration (NASA), 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. According to the Geospatial Information and Technology Association, employment in this field is growing at an annual rate of almost 35 percent, with the commercial subsection of the market expanding by 100 percent each year.

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

Admission Requirements
Application Requirements

- Application form and fee
- Three letters of recommendation
- Transcript(s)
- Professional goal statement
- GRE scores
- Résumé

Requirements for International Students

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

- Demonstrate English Language Proficiency (http://catalog.slu.edu/academic-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.

Application and Assistantship Application Deadlines

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

Review Process

Applications will be reviewed on a rolling basis as received, beginning Aug. 1 and continuing until the July 1 general application deadline.

Scholarships, Assistantships and Financial Aid

For priority consideration for graduate assistantship, applicants should complete their applications 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.

For more information, visit the student financial services office online at http://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 is 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 multi-criteria 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, data fusion.

Requirements

Code	Title	Credits
GIS 5010	Introduction to Geographic Information Systems	3
GIS 5020	Intermediate Geographic Information Systems	3
GIS 5040	Introduction to Remote Sensing	3
GIS 5060	Geospatial Methods in Environmental Studies	3
GIS 5070	Research Methods	3
GIS 5080	Digital Cartography and Geovisualization	3

GIS Electives		12
Select four from the following:		
GIS 5090	Introduction to Programming for GIS and Remote Sensing	
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	
GIS 5120	Geographic Information Science, Society and Sustainability	
BIOL 5190	Geographic Information Systems in Biology	
SOC 5640	Demography: Measuring & Modeling	
SOC 5670	Spatial Demography: Applied Statistics for Spatial Data	
SOC 5700	Applied Spatial Analysis	
Total Credits		30

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.

Full-time Student

Course	Title	Credits
Year One		
Fall		
!GIS 5010	Introduction to Geographic Information Systems	3
!GIS 5040	Introduction to Remote Sensing	3
!GIS 5070	Research Methods	3
GIS Elective (p. 3)		6
	Credits	15
Spring		
!GIS 5020	Intermediate Geographic Information Systems	3
!GIS 5060	Geospatial Methods in Environmental Studies	3
!GIS 5080	Digital Cartography and Geovisualization	3
GIS Elective (p. 3)		6
	Credits	15
	Total Credits	30

Part-time Student

Course	Title	Credits
Year One		
Fall		
❗GIS 5010	Introduction to Geographic Information Systems	3
❗GIS 5070	Research Methods	3
	Credits	6
Spring		
❗GIS 5020	Intermediate Geographic Information Systems	3
❗GIS 5080	Digital Cartography and Geovisualization	3
	Credits	6
Summer		
GIS Elective (p. 3)		3
	Credits	3
Year Two		
Fall		
❗GIS 5040	Introduction to Remote Sensing	3
GIS Elective (p. 3)		3
	Credits	6
Spring		
❗GIS 5060	Geospatial Methods in Environmental Studies	3
GIS Elective (p. 3)		3
	Credits	6
Summer		
GIS Elective (p. 3)		3
	Credits	3
	Total Credits	30

GIS Electives

Code	Title	Credits
GIS 5090	Introduction to Programming for GIS and Remote Sensing	3
GIS 5091	Advanced Programming for GIS and Remote Sensing	3
GIS 5092	Machine Learning for GIS and Remote Sensing	3
GIS 5100	Microwave Remote Sensing: SAR Principles, Data Processing and Applications	3
GIS 5110	Interferometric Synthetic Aperture Radar	3
GIS 5120	Geographic Information Science, Society and Sustainability	3
BIOL 5190	Geographic Information Systems in Biology	3
SOC 5640	Demography: Measuring & Modeling	3
SOC 5670	Spatial Demography: Applied Statistics for Spatial Data	3
SOC 5700	Applied Spatial Analysis	3