

# GEOSCIENCE, PH.D.

Saint Louis University's geology research facilities include a network of seismograph stations surrounding the New Madrid fault zone, state-of-the-art seismic observatories that transmit data by satellite from sites distributed across a broad region of the central United States; excellent computing facilities consisting of LINUX, Solaris, MAC and PC workstations; rock preparation and mineral separation facilities; a stable isotope geochemistry lab; a remote sensing lab; and a digital image analysis lab.

Extensive research is conducted at the Saint Louis University Earthquake Center and the Seismic Analysis and Remote Sensing Laboratories.

## Curriculum Overview

The Doctor of Philosophy in Geosciences requires a minimum of 48 credits of course work and exactly 12 credits of dissertation research. Up to 24 credits of course work leading to a master's degree may count toward the credit requirement.

Two concentrations are available:

- Geophysics
- Environmental geoscience

## Fieldwork and Research Opportunities

Active research areas in geophysics include earthquake seismology, tectonics, those in geology include tectonics, remote sensing, sedimentary geology and sedimentation, igneous and metamorphic petrology, geochemistry, geochronology, geomorphology and fluid-rock interaction, while those in environmental geosciences include river/reservoir sustainability, land use effects on water quality, contaminant transport, wetland biogeochemistry, hydro-geochemistry, fluvial geomorphology, coastal geomorphology and processes.

## Careers

The Ph.D. program prepares students for careers in academic research, teaching, government or industrial research environments. After graduating, alumni might pursue a career as an earthquake hazard analyst, environmental consultant or an exploration geophysicist.

## Admission Requirements

Successful applicants possess sufficient test scores, a sufficient GPA and sufficient TOEFL scores (for international students).

### Geophysics Concentration

Prerequisites include structural geology, college physics, mechanics and mathematics through differential equations.

### Environmental Geosciences Concentration

Prerequisites for master's degree: an undergraduate degree in a STEM discipline with at least one semester each of calculus, physics, biology, chemistry, and geoscience; a second semester of calculus or one semester of statistics.

### 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

Students who want to be considered for an assistantship must submit their applications by Feb. 1.

U.S. students should apply for the fall semester by July 1 and for the spring semester by Nov. 1. International students should apply for the fall semester by May 1 and for the spring semester by Oct. 1.

## Review Process

Faculty committee members examine qualified applicants' materials and make recommendations.

## 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 assess relevant literature or scholarly contributions in the earth and atmospheric sciences.
2. Graduates will be able to apply the major practices, theories, or research methodologies in the earth and atmospheric sciences.
3. Graduates will be able to apply knowledge from the earth and atmospheric sciences to address problems in broader contexts.
4. Graduates will be able to articulate arguments or explanations to both a disciplinary or professional audience and to a general audience, in oral forms.
5. Graduates will be able to articulate arguments or explanations to both a disciplinary or professional audience and to a general audience, in written forms.

6. Graduates will be able to evidence scholarly or professional integrity in earth and atmospheric sciences.

## Requirements

Code	Title	Credits
<b>Required Courses</b>		
EAS 4500	Scientific Communications	3
EAS 5900	Geoscience Journal Club	1
<b>Concentration Elective Courses</b>		
Select 31-32 credits of the following concentrations:		32
Geophysics (p. 2)		
Environmental Geosciences (p. 2)		
<b>Dissertation Research</b>		
EAS 5990	Thesis Research (taken over multiple semesters)	12
Total Credits		48

### Geophysics Concentration

The Master of Science (Thesis) in Geoscience with geophysics concentration requires a minimum of 24 credits plus a written thesis of six credits. The Master of Science in Geoscience (non-Thesis) with geophysics concentration, coursework option, requires a minimum of 30 credits and independent study.

Code	Title	Credits
<b>Concentration Requirements</b>		
EAS 5060	Physics of Solid Earth	3
<b>Concentration Choice #1</b>		
EAS 5170	Divergent & Convergent Margins	3
or EAS 5180	Trans Margins & Plate Interior	
<b>Concentration Choice #2</b>		
Select two of the following:		6
EAS 5040	Potential Theory	
EAS 5400	Continuum Mechanics in Wave Propagation	
EAS 5510	Seismic Exploration Methods	
& EAS 5520	and Seismic Exploration Lab	
<b>Concentration Elective Courses</b>		
Select 20 credits of the following:		20
EAS 5040	Potential Theory	
EAS 5070	Advanced Coastal Processes	
EAS 5080	Dynamics of the Atmosphere	
EAS 5090	Physics of the Atmosphere	
EAS 5110	Computing in Atmospheric Science	
EAS 5120	Time Series Analysis in Geophysics	
EAS 5150	Properties of Earth Materials	
EAS 5180	Trans Margins & Plate Interior	
EAS 5190	Seminar in Geoscience	
EAS 5200	Numerical Method of Prediction	
EAS 5230	Boundary Layer Meteorology	
EAS 5240	Tropical Meteorology	
EAS 5260	Synoptic & Dynamic Meteorology of the Jet Stream	
EAS 5270	Meteorology of Severe Storms	
EAS 5280	Environmental Geochemistry	
EAS 5290	Mesometeorology	

EAS 5330	Communicating in Research	
EAS 5340	Cloud Physics	
EAS 5360	Principles of Radiative Transference	
EAS 5380	Stat Methods in Meteorology	
EAS 5390	Seminar in Seismology	
EAS 5400	Continuum Mechanics in Wave Propagation	
EAS 5420	Advanced Structural Geology	
EAS 5430	Isotope Geochemistry	
EAS 5440	Advanced Sedimentary Geology	
EAS 5450	Advanced Petrology	
EAS 5460	Geodynamics	
EAS 5470	Turbulence	
EAS 5540	Potential and Electrical Exploration Methods	
EAS 5610	Satellite Meteorology	
EAS 5650	Radar Meteorology	
EAS 5700	Convection in the Atmosphere	
EAS 5720	Seismological Instrumentation	
EAS 5750	Land-Atmosphere Interaction	
EAS 5800	Synoptic and Mesoscale Circulation	
EAS 6100	Advanced Topics in Solid Earth Geophysics	
EAS 6190	Advanced Seminar in Geophysics	
EAS 6200	Advanced Geomagnetism	
EAS 6310	Advanced Seismology I	
EAS 6320	Advanced Seismology II	
EAS 6480	Gen Circulation of Atmosphere	
EAS 6590	Numeric Methods of Atmospheric Sciences	
EAS 6981	Independent Study	
Total Credits		32

### Environmental Geosciences Concentration

Code	Title	Credits
<b>Concentration Elective Courses</b>		
Select 32 credits of the following:		32
EAS 5040	Potential Theory	
EAS 5060	Physics of Solid Earth	
EAS 5070	Advanced Coastal Processes	
EAS 5080	Dynamics of the Atmosphere	
EAS 5090	Physics of the Atmosphere	
EAS 5110	Computing in Atmospheric Science	
EAS 5120	Time Series Analysis in Geophysics	
EAS 5150	Properties of Earth Materials	
EAS 5170	Divergent & Convergent Margins	
EAS 5180	Trans Margins & Plate Interior	
EAS 5190	Seminar in Geoscience	
EAS 5200	Numerical Method of Prediction	
EAS 5220	Geophysical Data Processing	
EAS 5230	Boundary Layer Meteorology	
EAS 5240	Tropical Meteorology	
EAS 5260	Synoptic & Dynamic Meteorology of the Jet Stream	
EAS 5270	Meteorology of Severe Storms	
EAS 5280	Environmental Geochemistry	

EAS 5290	Mesometeorology
EAS 5330	Communicating in Research
EAS 5340	Cloud Physics
EAS 5360	Principles of Radiative Transference
EAS 5380	Stat Methods in Meteorology
EAS 5390	Seminar in Seismology
EAS 5400	Continuum Mechanics in Wave Propagation
EAS 5420	Advanced Structural Geology
EAS 5430	Isotope Geochemistry
EAS 5440	Advanced Sedimentary Geology
EAS 5450	Advanced Petrology
EAS 5460	Geodynamics
EAS 5470	Turbulence
EAS 5510	Seismic Exploration Methods
EAS 5520	Seismic Exploration Lab
EAS 5540	Potential and Electrical Exploration Methods
EAS 5610	Satellite Meteorology
EAS 5650	Radar Meteorology
EAS 5700	Convection in the Atmosphere
EAS 5720	Seismological Instrumentation
EAS 5750	Land-Atmosphere Interaction
EAS 5800	Synoptic and Mesoscale Circulation
EAS 6100	Advanced Topics in Solid Earth Geophysics
EAS 6190	Advanced Seminar in Geophysics
EAS 6200	Advanced Geomagnetism
EAS 6310	Advanced Seismology I
EAS 6320	Advanced Seismology II
EAS 6480	Gen Circulation of Atmosphere
EAS 6590	Numeric Methods of Atmospheric Sciences
EAS 6981	Independent Study

Total Credits 32

### 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.

### Geophysics Concentration Roadmap

Course	Title	Credits
<b>Year One</b>		
<b>Fall</b>		
Advanced Seismology I		3
Physics of Solid Earth		3

Journal Club	0
Elective	3
Credits	9
<b>Spring</b>	
Convergent Divergent Margins	3
Scientific Communication	3
Journal Club	0
Elective	3
Credits	9
<b>Summer</b>	
Delete summers if not needed	
Dissertation Research	2
Credits	2
<b>Year Two</b>	
<b>Fall</b>	
EAS 5040 Potential Theory	3
Seminar in Geoscience	2
Journal Club	1
Elective	3
Credits	9
<b>Spring</b>	
Continuum Mechanics	3
Journal Club	0
Elective	3
Elective	2
Credits	8
<b>Summer</b>	
Delete summers if not needed	
Dissertation Research	2
Credits	2
<b>Year Three</b>	
<b>Fall</b>	
Time Series Analysis	3
Advanced Seismology I	3
Journal Club	0
Credits	6
<b>Spring</b>	
Advanced Seismology II	3
Journal Club	1
Credits	4
<b>Summer</b>	
Delete summers if not needed	
Dissertation Research	2
Credits	2
<b>Year Four</b>	
<b>Fall</b>	
Dissertation Research	1
Journal Club	0
Credits	1
<b>Spring</b>	
Dissertation Research	1

Journal Club	
Credits	1
<b>Summer</b>	
Delete summers if not needed	
Dissertation Research	2
Credits	2
<b>Year Five</b>	
<b>Fall</b>	
Delete if not needed	
Dissertation Research	1
Journal Club	0
Credits	1
<b>Spring</b>	
Delete if not needed	
Dissertation Research	1
Journal Club	0
Credits	1
<b>Total Credits</b>	
	57

### Environmental Geosciences Concentration Roadmap

Course	Title	Credits
<b>Year One</b>		
<b>Fall</b>		
Elective	Principles of Biostatistics	3
Elective	Introduction to Remote Sensing	3
Journal Club		0
Elective (Electives are chosen with advisor to tailor to student needs)		3
Credits		9
<b>Spring</b>		
Elective	Water Treatment Systems	3
Scientific Communication		3
Journal Club		0
Elective	Soil Energy	3
Credits		9
<b>Summer</b>		
Delete summers if not needed		
Dissertation Research		3
Credits		3
<b>Year Two</b>		
<b>Fall</b>		
Elective	Programming for Remote Sensing/GIS	3
Seminar in Geoscience		2
Journal Club		1
Credits		6
<b>Spring</b>		
Elective		3
Journal Club		0
Elective		3
Elective		2
Credits		8

<b>Summer</b>	
Delete summers if not needed	
Dissertation Research	2
Credits	2
<b>Year Three</b>	
<b>Fall</b>	
Elective	3
Elective	3
Journal Club	0
Credits	6
<b>Spring</b>	
Elective	3
Journal Club	1
Credits	4
<b>Summer</b>	
Delete summers if not needed	
Dissertation Research	2
Credits	2
<b>Year Four</b>	
<b>Fall</b>	
Dissertation Research	1
Journal Club	0
Credits	1
<b>Spring</b>	
Dissertation Research	1
Journal Club	0
Credits	1
<b>Summer</b>	
Delete summers if not needed	
Dissertation Research	2
Credits	2
<b>Year Five</b>	
<b>Fall</b>	
Delete if not needed	
Dissertation Research	1
Journal Club	0
Credits	1
<b>Spring</b>	
Delete if not needed	
Dissertation Research	1
Journal Club	0
Credits	1
<b>Total Credits</b>	
	55