PhD in Informatics with Emphasis in Geospatial Informatics

Geospatial informatics is a field that focuses on the use of data science and artificial intelligence (AI) technology to collect, analyze, interpret, and visualize spatial data. Geospatial informatics plays a crucial role in understanding and addressing spatial patterns, relationships, and trends across diverse disciplines, including public health, environmental science, climate challenges, disaster management, homeland security, agriculture, and more. By leveraging geospatial data, professionals in these fields can help make informed decisions, plan and manage resources, and solve complex problems that have a spatial component. The geospatial emphasis area stresses skill sets and research of data science and informatics. A core curriculum provides all students with a foundation of knowledge and tools in data science, geospatial data engineering, and advanced geospatial AI. The integrated program assures broad exposure to the field and fosters new insights and innovative research concepts. Graduates go on to become tenure-track faculty, senior informaticians and data scientists in national laboratories, as well as private industry.

Degree Requirements

All students must have at least 72 credit hours at the graduate level, of which 15 credits must be at the 8000-level not including research, problems, lab rotations, or seminar. Transferring credits will be at the recommendation of the student's doctoral committee and the approval of the MUIDSI Education Committee.

Required Core Courses - Geospatial Informatics Area		
DATA_SCI 7010	Principles of Data Science and Analytics	3
DATA_SCI 8520	Spatial Analytics and Geostatistical Analysis	3
Required Methods Courses (9 Credit Minimum)		
INFOINST 8810	Research Methods in Informatics	3
DATA_SCI 7020	Statistical and Mathematical Foundations for Data Analytics	3
or STAT 7510	Applied Statistical Models I	
Student must choose one additional 3-credit methods course with doctoral committee approval.		
Lab Rotations and Seminar		
INFOINST 8087	Seminar in Informatics	0.5-1
INFOINST 8088	Lab Rotations in Informatics	1-3
Research		
INFOINST 8090	Dissertation (pre-candidacy) Research in Informatics	1-99
INFOINST 9090	Dissertation (post-candidacy) Research in Informatics	1-99
Emphasis Area Course Requirements (Must select at least 9 credits from the following list)		
DATA_SCI 8510	Geospatial Data Engineering and Geodatabase Development	3
DATA_SCI 8530	Geospatial AI and Image Analysis	3
GEOG 7710	Spatial Analysis in Geography	3
GEOG 7740	Location Analysis and Site Selection	3
GEOG 7810	Landscape Ecology and GIS Analysis I	3
GEOG 7840	Geographic Information Systems I	3
GEOG 7940	Advanced Geographic Information Systems (GIS II)	3
GEOG 7860	Advanced Remote Sensing	3
GEOG 8840	Seminar: Applied Remote Sensing	3
Area Course Electives (Must select at least 6 credits from the following list)		
AN_SCI 8633	Molecular and Network Evolution	3
BIOL_EN 7560	Observing the Earth from Space	3
CMP_SC 7380	Database Management Systems I	3
CMP_SC 7740	Interdisciplinary Introduction to Natural Language Processing	3
CMP_SC 8370	Data Mining and Knowledge Discovery	3
CMP_SC 8630	Data Visualization	3
CMP_SC 8725	Supervised Learning	3
CMP_SC 8735	Unsupervised Learning	3
DATA_SCI 7030	Applied SQL for Database and Analytics	3
DATA_SCI 7040	Big Data Visualization	3
DATA_SCI 8110	Genomics Analytics	3
DATA_SCI 8120	Multi-Omics Analytics	3
DATA_SCI 8130	Data Science for Health Care	3
DATA_SCI 8140	Advanced Methods in Health Data Science	3
DATA_SCI 8150	Precision Medicine Analytics	3
DATA_SCI 8160	Population Health Analytics	3
DATA_SCI 8230	Streaming Social Media Data Management and Analytics	3
DATA_SCI 8410	Data Mining and Information Retrieval	3
DATA_SCI 8420	Cloud Computing for Data Analytics	3
DATA_SCI 8430	Parallel Computing for Data Analytics	3
DATA_SCI 8310	Advanced Visualization I	3
DATA_SCI 8320	Advanced Visualization II	3
ECE 7270	Computer Architecture	4
ECE 7590	Computational Neuroscience	4
ECE 8320	Nonlinear Systems	3
ECE 8570	Neural Dynamics and Communication	3
ECE 8580	Machine Learning in Neuroscience	3
BBME 7410	Introduction to the US Health Care System for Biomedical Informatics	3
BBME 8435	Information Security, Evaluation and Policy	3
BBME 8437	Data Warehousing and Data/Text Mining for Health Care	3
BBME 8441	Biomedical and Health Vocabularies and Ontologies	3
BBME 8443	Enterprise Information and Solutions Architecture for Strategic Healthcare Operations	3
BBME 8571	Decision Support in Health Care Systems for Biomedical Informatics	3
BBME 8610	Consumer Health Informatics	3
INFOINST 8190	Computational Systems Biology	3
INFOINST 8450	Precision Medicine Informatics	3
INFOINST 8870	Knowledge Representation in Biology and Medicine	3

IS_LT 9410	Seminar in Information Science and Learning Technology	1-3
NURSE 9460	Theories and Interventions in Health Behavior Science	3
PTH_AS 7450	Precision Medicine Informatics	3

The following is a brief synopsis of the general degree requirements; please see the Informatics Institute web site (https://muii.missouri.edu/) for complete details:

- Students must take required and area courses.
- Students must pass a qualifying examination.
- Students must present at least one institutional seminar annually.
- Students are required to complete a comprehensive exam, which includes written and oral elements, within a specified time frame.
- Students must pass a comprehensive examination at least 7 months before their scheduled defense.
- Students must submit and defend a dissertation describing the results of successful and original research in one of the branches of informatics.
- To show research progress, students are expected to be working toward presenting at conferences and publishing in peer-reviewed journals based on their informatics research.

Sample Plan of Study

A student's own plan of study will vary depending on their pace in the program and individual choices where options are available.

First Year			
Fall	**CR**	**Spring**	**CR**
DATA_SCI 7010	3	DATA_SCI 7020	3
DATA_SCI 8520	3	DATA_SCI 8530	3
INFOINST 8087	1	INFOINST 8810	3
INFOINST 8088	1	INFOINST 8087	1
INFOINST 8090	2	INFOINST 8088	1
	10		**11**
Second Year			
Fall	**CR**	**Spring**	**CR**
STAT 7520	3	GEOG 7940	3
DATA_SCI 8510	3	DATA_SCI 8010	3
DATA_SCI 7040	3	INFOINST 8087	1
INFOINST 8087	1	INFOINST 8090	3
INFOINST 8090	1		
	11		**10**
Third Year			
Fall	**CR**	**Spring**	**CR**
INFOINST 8087	1	INFOINST 8087	1
INFOINST 8090	8	INFOINST 8090	8
	9		**9**
Fourth Year			
Fall	**CR**	**Spring**	**CR**
INFOINST 8087	1	INFOINST 8087	1
INFOINST 9090	3	INFOINST 9090	3
	4		**4**
Fifth Year			
Fall	**CR**	**Spring**	**CR**
INFOINST 8087	1	INFOINST 8087	1
INFOINST 9090	1	INFOINST 9090	1
	2		**2**

Total Credits: 72