Information

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The University of Texas at Dallas

Doctor of Philosophy in Geospatial Information Sciences

An interdisciplinary research degree focused on advancing the frontiers of knowledge and understanding of spatially-referenced information

http:///www.gis.utdallas.edu

The *Doctor of Philosophy in Geospatial Information Sciences* at UTD aims to cultivate innovative researchers capable of advancing the frontiers of knowledge in the geospatial information sciences through improved theory, advanced methodology, sophisticated quantitative analysis, innovative technology and integrative application. The degree is jointly offered by the School of Social Sciences, the School of Natural Sciences and Mathematics (specifically in the Department of Geosciences) and the Eric Jonsson School of Engineering and Computer Science.

Unlike programs at other schools in which geospatial information sciences is offered as a concentration within traditional geography, geology, environmental science or engineering programs, the degree at UTD is devoted solely to GI Science. As such, it provides a unique option for students wishing to concentrate in this inherently cross-disciplinary area.

Students will find employment in the burgeoning geospatial technology industry, in research departments of public and private organizations, as well as in more traditional academic positions because of their ability to build bridges to other areas.

It is anticipated that many students will enter the program with a bachelor's or master's degree (and/or work experience) in an application area (such as public administration, geology, or economics) or in a technical specialization (such as engineering, computer science, or statistics) with the intent of advancing existing practice with geospatial information sciences in that application area or expanding the technological or theoretical base for geospatial information sciences

Admission

The PhD program in GISci seeks applications from students with a baccalaureate, Master of Arts, Master of Science or professional masters-level degree in any field relevant to geospatial information science including, but not limited to, geography and the social sciences, geology, computer science, management information systems, statistics, economics, marketing, city and regional planning, natural resource management. A grade point average of at least 3.25 in undergraduate and master's work, and a combined verbal and quantitative score of 1150 or more on the GRE are desirable. Admission may be conducted on-line at: *www.utdallas.edu/student/admissions* *(degree code SS-GSIS)*

The following pre-requisites/co-requisites are also required for admission to the PhD program: (i) college mathematics through calculus, (ii) competence in at least one modern programming language and (iii) at least one course in inferential statistics through to regression analysis. Graduate courses taken at UTD to meet these pre-requisites may be counted as electives toward the 90 credit hours required for the degree.

Curriculum

The program requires a minimum of 90 hours of graduate work beyond the Bachelor's degree., of which 42 hours are in formal, organized classes. Up to 36 hours of course work may be transferred from another institution.

In the process of completing the Ph.D. from the baccalaureate level at UTD, a *Graduate Certificate in Geographic Information Systems, a Graduate Certificate in Remote Sensing* and a *Master of Science*

in Geographic Information Sciences or a *Master of Science in Computer Science* or a *Master of Science in Geoscience* may also be obtained.

To receive the *PhD in Geospatial Information Sciences*, students must:
(i) complete the **Geospatial Science Core** (15 SCH), (ii) have a **Geospatial Specialization Area** (15 SCH), (iii) have a specific **Application Area or Technical Field** (12 SCH), (iv) evidence **research skills** through completion and defense of a Ph.D. dissertation, and (v) take related **electives** as necessary for a total of 90 semester credit hours. In addition, students must satisfy a set of exams and qualifiers.

Geospatial Science Core (15 credit hours)

GISC6381	GIS Fundamentals
GISC6382	Applied GIS
GISC6384	Spatial Analysis and Modeling
GISC6385	GIS Theories, Models and Issues
GISC6387	GIS Workshop

Geospatial Specialization Areas (select from <u>one</u>, with a minimum of 15 credit hours; other courses available)

Geospatial Computing and Information Management	
CS 6378	Advanced Operating Systems
CS 6359	Object Oriented Analysis and Design
CS 6360	Database Design
CS 6V80	Spatial Data Management
CS 6364	Artificial Intelligence
CS 6366	Computer Graphics
CS 6384	Computer Vision
CS 6381	Combinatorics and Graph Algorithms
CS 6375	Neural Nets and Machine Learning
GISC 6383	GIS Management and Implementation
GISC 7363	Internet Mapping and Info. Management
GISC 6488	GIS Application Development
*MIS 6326	Database Management Systems
Spatial Statistics and Modeling	
POEC5313	Descriptive and Inferential Statistics
POE5316	Advanced Regression Analysis
ECO5311	Econometrics
GISC7361	Spatial Statistics
GISC7362	GIS Network Modeling
GE0S530	Data Analysis for Geoscientists
GISC7364	Advanced Raster Modeling
CS 5343	Data Structures
Remote Sensing and Satellite Technologies	
GEOS5425	Intro to Remote Sensing
GEOS5329	Applied Remote Sensing
GEOS5326	Remote Sensing Digital Image Processing
GEOS5328	Radar Remote Sensing
GEOS5422	GPS Satellite Surveying Techniques
GEOS5423	GIS Applications to Geoscience
GEOS7327	Remote Sensing Workshop
EE 6369	Digital Signal Processing
EE6363	Digital Image Processing
Customized Geospatial Specialization	
	Identified by the student with approval in advance by the Director of the GIS Doctoral Program.

Application Area or Technical Field (12 SCH)

Twelve semester-credit hours of specialized course work in an *application area* or *technical field* relevant to GIScience. Normally, these will derive from the student's masters degree. These hours may be transferred from another institution, or taken at UTD in an existing master's program area and may be applied toward a master's in that area.

Application area examples: planning, public affairs, criminal justice, health and epidemiology, geoscience, forestry, hydrology, marketing, real estate, economics, civil engineering, etc..

Technical field examples: statistics, computer science, software engineering, management information systems, image analysis, operations research, instrumentation, etc...

Faculty

Dr. Mohamed G. Abdelsalam specializes in geological and environmental remote sensing and digital image processing applications, especially for arid regions.
Dr Carlos Aiken, a geophysicist and expert in GPS (Global Positioning Systems), specializes in potential field techniques and digital spatial data acquisition.
Dr Brian Berry AICP, is the world's most frequently cited geographer and a founding member of the *American Institute of Certified Planners*. Before joining UTD he was Williams Professor of City and Regional Planning at Harvard University, and also directed the *Laboratory for Computer Graphics and Spatial Analysis* which provided the research foundation on which modern GIS is built.
Dr Ronald Briggs, a geographer by training, directed computing and telecommunications for the University for 13 years before returning to his academic specialty in spatial demographics and GIS.
Dr Kevin Curtin is a GI scientist with special interests in data modeling, particularly for transportation.
Dr John Ferguson is a geophysicist with interests in GPS, signal processing, and spatial data analysis.
Dr Dan Griffith is a quantitative geographer with expertise in spatial statistics, epidemiological and environmental assessment using GIS.
Dr Karen Hayslett-McCall, a criminologist and former patrol officer, specializes in the application of GIS to support policing.
Dr Latifur Khan, a computer scientist with Ph.D. from the University of Southern California, has research interests which include database systems and multimedia information management.
Dr Jim Murdoch, an economist, specializes in econometric and spatial analysis applied to environmental and urban issues.
Dr Fang Qiu focuses on GIS and Remote Sensing modeling for urban and environmental applications.
Dr Edwin Sha, a computer scientist with Ph.D. from Princeton University, specializes in high performance computing systems.
Dr Robert Stern, a geologist, specializes in remote sensing applications with an interest in the geology of both the Middle East and the D/FW Metroplex.
Dr. Michael Tiefelsdorf, a geographer, specializes in spatial analysis and statistics, with emphasis on medical/epidemiological applications, demography and migration.
Dr. Weili Wu, a computer scientist with her Ph.D from the University of Minnesota, specializes in spatial database design.
Dr Kang Zhang, a computer scientist with Ph.D. from the University of Brighton (UK), has interests which include software engineering, visual design and data mining.
Associated faculty include **Dr. Stuart Murchison** *(Director of GIS, City of Dallas*) and **Mr. Jack Lyle RPLS, MSGIS**, a Registered Public Land Surveyor

UTD is a member of UCGIS—University Consortium for Geographic Information Sciences