School of Economic, Political and Policy Sciences

Graduate Programs in Geospatial Information Sciences

Doctor of Philosophy in Geospatial Information Sciences

75 semester credit hours minimum beyond the baccalaureate degree

EPPS Faculty

Professors: Brian J. L. Berry, Denis J. Dean, Daniel A. Griffith, Fang Qiu, May Yuan
Associate Professors: Yongwan Chun, Dohyeong Kim, Michael Tiefelsdorf
Assistant Professors: Anthony R. Cummings, Andrew Wheeler

ECS Faculty

Professors: Xiaohu Guo, Latifur Khan, Weili Wu, Kang Zhang

NSM Faculty

Professors: Carlos L. V. Aiken, John F. Ferguson, John W. Geissman, David Lumley
Associate Professors: Thomas H. Brikowski, David J. Lary
Assistant Professor: Hejun Zhu

Mission

The mission of the Doctor of Philosophy in Geographic Information Sciences program is to cultivate innovative researchers capable of advancing the frontiers of knowledge in the geospatial information sciences through improved theories, new technologies, innovative methodologies, sophisticated quantitative analyses, and integrative applications. Specifically, program graduates will:

- Demonstrate their knowledge of the fundamental theories and concepts underlying the geospatial sciences.
- Master the advanced methodologies and/or quantitative analyses used in at least one of three geospatial specialization areas: (a) computing and information management, (b) spatial analysis and modeling, or (c) remote sensing and satellite technologies.
- Produce innovative research that advances theory or methodology in the geospatial sciences.
- Participate at academic conferences, publish in peer-reviewed journals, and find employment in research departments of public and private organizations and in major academic institutions.

Objectives

This degree program is multidisciplinary with courses from the School of Economic, Political and Policy Sciences, the School of Natural Sciences and Mathematics (specifically in the Department of Geosciences) and the Erik Jonsson School of Engineering and Computer Science, and is administered by the School of Economic,
Political and Policy Sciences. This unique structure reflects geospatial information science's origins as the confluence of multiple disciplines including geography, computer science, engineering, geology, and various social, policy and applied sciences. 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). These students may choose to pursue research projects that advance existing geospatial information sciences practices within that application area. Alternatively, students may opt to pursue research that expands the technological or theoretical base of all the geospatial information sciences.

Powerful technologies have emerged in recent years to collect, store, manage, analyze, and communicate information regarding the features of the Earth's surface and to combine these with other types of environmental, social, and economic information. These technologies, which include geographic information systems (GIS), the global positioning system (GPS), and remote sensing, are used in many ways, including the production of digital maps in vehicles, the management and maintenance of city infrastructure, agriculture and forestry, the policing of communities, and the conduct of modern warfare. The PhD in Geospatial Information Sciences aims to develop individuals capable of advancing this field by developing new knowledge or capabilities relevant to it.

Facilities

Students have access to state-of-the-art GIS computing facilities housed in the School of Economic, Political and Policy Sciences and at the NASA Center for Excellence in Remote Sensing in the Department of Geosciences. The University's extensive instructional computing facilities, including those in the Erik Jonsson School of Engineering and Computer Science, are also available. Facilities are open extended hours including evenings and weekends. Enrollment in hands-on courses is controlled to ensure that a computer workstation is available for every student. All major industry-standard GIS and remote sensing software is available. The University is a member of the University Consortium for Geographic Information Science (UCGIS).

Admission Requirements

The University's general admission requirements are discussed on the Graduate Admission page. The PhD program in Geospatial Information Sciences seeks applications from students with a baccalaureate, Master of Arts, Master of Science, or professional master's level degree in any field relevant to geospatial information science including, but not limited to, computer science, economics, engineering, geography, geology, management information systems, marketing, natural resource management, public affairs and public administration, statistics, and urban and regional planning. Applicants will be judged and evaluated by the existing admission standards as set forth by the University in its Graduate Catalog and by the standards set forth here by the Geospatial Information Sciences program. A bachelor's degree from an institution of higher education or its equivalent and fluency in written and spoken English are required. A grade average of at least 3.25 in undergraduate and graduate course work, and a combined verbal and quantitative score of 300 on the GRE are desirable. An analytical writing score of at least 4.5 in the GRE is considered desirable.

Applicants must submit transcripts from all higher education institutions attended, three
letters of recommendation, and an essay outlining their background, education, and academic objectives as they specifically relate to a PhD in Geospatial Information Sciences.

Prerequisites

The following prerequisites/corequisites will also be required for admission to the PhD program: (i) college mathematics through calculus, (ii) competence in at least one modern programming language equivalent to GISC 6317 GIS Programming Fundamentals, and (iii) at least one course in inferential statistics through to regression analysis equivalent to GISC 6301 GIS Data Analysis Fundamentals, EPPS 7313 Descriptive and Inferential Statistics, or GEOS 5306 Data Analysis for Geoscientists. Graduate courses taken at UT Dallas to meet these prerequisites may be counted as electives toward the 75 semester credit hours required of students entering the PhD program directly from a BA or BS degree, but they shall not be considered substitutes for any other specified course.

Advising

Because of the cross-disciplinary nature of this doctoral program, to ensure adequate preparation and appropriate course sequencing, every doctoral student is required to consult with the student's designated advisor and/or the GIS Doctoral Program Director prior to registration in every semester. Students generally will not have a faculty advisor when they first enter the PhD program, but every student is required to select (with consent of the potential advisor) an advisor from the advising faculty by the end of his/her first academic year.

Degree Requirements

The University's general degree requirements are discussed on the Graduate Policies and Procedures page.

To receive the PhD in Geospatial Information Sciences, students must complete the Geospatial Science Core (15 semester credit hours) to achieve a mastery of appropriate Geospatial Information Science technologies and theory, have Prescribed Specialization Electives (15 semester credit hours), have a Specific Application area or Technical field (12 semester credit hours), evidence research skills through successful completion and defense of a PhD dissertation, and take related electives as necessary for a total of 75 semester credit hours. A maximum of 6 semester credit hours can be taken at the 5000 level and the rest of them should be at the 6000 level or above. In addition, students must satisfy a set of exams and qualifiers. Other courses may be substituted for those listed below with the written permission in advance of the Director of the GIS Doctoral program.

Geospatial Science Core: 15 semester credit hours

Students must earn a minimum grade point average (GPA) of 3.0 across the following five courses:

- **GISC 6381** (GEOS 6381) Geographic Information Systems Fundamentals
- **GISC 6325** (GEOS 5325) Remote Sensing Fundamentals
- **GISC 6384** (GEOS 6384) Advanced Geographic Information Systems
Prescribed Specialization Electives: 15 semester credit hours
Students must choose one of the following areas. Courses selected must include at least three at successively advanced levels.

I. Geocomputation and Remote Sensing

- **CS 5303** Computer Science I
- **CS 5333** Discrete Structures
- **CS 5343** Algorithm Analysis and Data Structures
- **CS 6359** Object-Oriented Analysis and Design
- **CS 6360** Database Design
- **CS 6364** Artificial Intelligence
- **CS 6366** Computer Graphics
- **CS 6375** Machine Learning
- **CS 6384** Computer Vision
- **EESC 6360** Digital Signal Processing I
- **EESC 6363** Digital Image Processing
- **GISC 5322** (GEOS 5322) GPS (Global Positioning System) Satellite Surveying Techniques
- **GISC 5324** (GEOS 5324) 3D Data Capture and Ground Lidar
- **GISC 5330** Geospatial Applications in Earth Science
- **GISC 5395** Satellite Geophysics and Applications
- **GISC 6317** GIS Programming Fundamentals
- **GISC 6388** Advanced GIS Programming
- **GISC 7363** Internet Mapping and Information Processing
- **GISC 7365** (GEOS 5326) Advanced Remote Sensing
- **GISC 7366** (GEOS 5329) Applied Remote Sensing
- **MIS 6320** Database Foundations
- **MIS 6324** Business Intelligence Software and Techniques
- **MIS 6360** Agile Project Management
- **MIS 6326** Data Management
- **PHYS 5315** Scientific Computing
II. Spatial Analysis and Modeling

- **ECON 6309** Econometrics I
- **ECON 7309** Econometrics II
- **EPPS 7313** Descriptive and Inferential Statistics
- **EPPS 7316** Regression and Multivariate Analysis
- **EPPS 7318** Structural Equation and Multilevel (Hierarchical) Modeling
- **EPPS 7370** Time Series Analysis I
- **EPPS 7390** Bayesian Analysis for Social and Behavioral Sciences
- **GISC 7364** Demographic and Epidemiological Analysis and Modeling
- **GEOS 5306** Data Analysis for Geoscientists
- **GISC 6311** Statistics for Geospatial Science
- **GISC 6331** (CRIM 6332) GIS Applications in Criminology
- **GISC 6334** (PPPE 6334) Workshop in Environmental and Health GIS/Policy
- **GISC 6379** Special Topics in Geographic Information Sciences
- **GISC 6382** (GEOS 6383) Applied Geographic Information Systems
- **GISC 7360** GIS Pattern Analysis
- **GISC 7361** Spatial Statistics
- or **ECON 6316** Spatial Econometrics

III. 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 semester credit hours)

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 master's degree. These semester credit hours may be transferred from another institution, or taken at UT Dallas in an existing master's program area and may be applied toward a master's degree 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/location science, instrumentation.

Research and Dissertation (variable semester credit hours)

All students must complete the following class as part of the research and dissertation
requirement:

**GISC 7387** GIS Research Design

In addition, students must complete sufficient additional research and dissertation semester credit hours to bring the total number of semester credit hours they have earned within the UT Dallas doctoral program (or transferred into the UT Dallas doctoral program) to 75 semester credit hours, the minimum required to earn a doctoral degree. Additional research and dissertation semester credit hours above and beyond those required to reach the 75 semester credit hours minimum may be required at the discretion of the student's PhD advisor. Additional research and dissertation semester credit hours can be earned through any course from the following list:

**GISC 6387** Geospatial Sciences Workshop

**GISC 6389** Geospatial Information Sciences Master's Research

**EPPS 6342** Research Design II

**GISC 8320** Geospatial Sciences Seminar

**GISC 8V29** Research in GIS

**GISC 8V99** or **CS 8V99** Dissertation

Other Related Electives [0 to 24 semester credit hours]

Students may choose up to 24 semester credit hours in related electives (from CS, GEOS, GISC, etc.) with consent of their advisor or the GIS Doctoral Program Director.

Exams and Qualifiers

Qualifying Examination

The GISC PhD Qualifier Examination is administered in May of a full-time doctoral student's first year, following the completion of the first academic year (i.e. fall and spring semester) by the student. This exam comprises of four parts, each based upon one of the following core courses:

**GISC 6325** Remote Sensing Fundamentals

**GISC 6384** Advanced Geographic Information Systems

**GISC 6385** GIS Theories, Models and Issues

**GISC 7310** Advanced GIS Data Analysis

A student must pass three of the four parts to pass the exam. If a student fails his/her exam, s/he may retake only the parts they failed in the subsequent August. If s/he does not pass a cumulative total of three parts after the August exam date, then s/he fails the Qualifier Examination, and is withdrawn from the GIS doctoral program.

Defense of Proposal

After completing the **GISC 7387** GIS Research Design class, doctoral students must successfully present and defend a dissertation proposal through an oral examination, according to uniform guidelines established by the GIS program.
Grade Point Qualifier

Doctoral students must have GPAs of at least 3.25, and preferably 3.5, in courses taken at UT Dallas at the time they register for GISC 7387 GIS Research Design, or they must petition the GIS faculty for an exemption for extenuating circumstances beyond the student's control.

Defense of Dissertation

A dissertation must be prepared and defended successfully following the procedures established by the Dean of Graduate Studies.

Note: Individuals experienced with GIS may have the introductory course (GISC 6381) waived at the discretion of the Geospatial Information Sciences Program Head, but must take an additional course from the prescribed specialization elective courses listed above.

Master of Science in Geospatial Information Sciences

36 semester credit hours minimum

EPPS Faculty

Professors: Brian J. L. Berry, Denis J. Dean, Daniel A. Griffith, Fang Qiu, May Yuan
Associate Professors: Yongwan Chun, Dohyeong Kim, Michael Tiefelsdorf
Assistant Professors: Anthony R. Cummings, Andrew Wheeler
Senior Lecturers: Bryan Chastain, Irina Vakulenko

NSM Faculty

Professors: Carlos L. V. Aiken, John F. Ferguson, John W. Geissman, David Lumley
Associate Professors: Thomas H. Brikowski, David J. Lary
Assistant Professor: Hejun Zhu

Mission

The mission of both tracks of the Master of Science in Geospatial Information Sciences program is to provide students a rigorous understanding of the technologies, quantitative techniques, models and theories used to acquire and manage spatially referenced information, analyze spatial processes, communicate spatial information, and provide spatial decision support. The second track has the additional mission of providing students with a thorough understanding of the scientific research method. UT Dallas graduates will have strong analytical and numerical skills, knowledge of empirical and quantitative research methodologies, and employ novel geographic information sciences technologies. They will use these capabilities to support public and private sector organizations, to address significant societal issues, and to enhance understanding of the human and natural environments. They will successfully compete at the highest level for jobs requiring geospatial skills and for entry into quality doctoral programs in relevant areas. More specifically, graduates of the program will:

- Possess a thorough knowledge of the technologies, quantitative techniques, models and theories used to acquire and manage spatially referenced information and to analyze spatial processes.
- Have strong analytical and numerical skills, knowledge of empirical and quantitative...
research methodologies, and be able to employ these skills and methodologies in novel geographic information sciences applications.

- Be able to identify and apply appropriate geospatial methodologies to support public and private sector organizations, to address significant societal issues, and to enhance understanding of the human and natural environments.
- Successfully compete at the highest level for jobs requiring geospatial skills and for entry into quality doctoral programs in relevant areas.

Objectives

Students may choose between two tracks within the Master of Science in Geospatial Information Sciences program. Both tracks are offered jointly by the School of Economic, Political and Policy Sciences and the School of Natural Sciences and Mathematics. The first track is a professional program that focuses on the use of Geographic Information Systems (GIS) and associated technologies such as remote sensing and global positioning systems for acquiring, describing, managing, analyzing and communicating spatially-referenced information in order to provide decision support. This track emphasizes coursework, and involves a GIS Master's Research class where a student needs to identify a faculty member as his/her master's advisor, prepare a proposal for a professional GIS Master's project, and conduct research under the supervision of the advisor. To obtain his/her master's degree, a student must present the master's project to the faculty and fellow students and successfully defend it. Students are expected to master the concepts underlying GIS, the skills for implementing GIS projects in public or private sector organizations, and the ability to use GIS in pure or applied research in substantive areas. Graduates can apply their skills in a variety of areas such as public administration and policy analysis; public safety, criminology, emergency preparedness management; environmental and resource management; urban, regional, social service and transportation planning and analysis; marketing, site selection, logistics and real estate; and resource exploration, including petroleum.

The second track of the Master's of Science in Geospatial Information Sciences program is a conventional program that offers a balance between coursework and research. A student needs to register for a Master's Thesis class (GISC 6V98) under a supervising advisor to conduct a research project, which will ultimately lead to a research-oriented master's thesis. To obtain his/her master's degree, a student must present the master's thesis to the faculty and fellow students and successfully defend it. This track is aimed at students who want to hone their research skills, and is the preferred route for students who may want to move to a doctoral program. Graduates in this track can apply their skills to the same areas as graduates from the first track, but also have the option of moving into research-oriented jobs, and maximizing their ability to move into doctoral programs.

Facilities

Classes are offered through state-of-the-art GIS computing facilities housed in the School of Economic, Political and Policy Sciences and the NASA Center for Excellence in Remote Sensing in the Department of Geosciences. The University's extensive instructional computing facilities are also available. Facilities are open extended hours including evenings and weekends. Enrollment in hands-on courses is controlled to ensure that a computer workstation is available for every student. All industry-standard
GIS and remote sensing software is available. The University is a member of the University Consortium for Geographic Information Science (UCGIS).

Admissions Requirement

The University's general admission requirements are discussed on the Graduate Admissions page.

For admission to the program, a baccalaureate degree from an accredited university or college is required and Graduate Record Examination (GRE) or Graduate Management Aptitude Test (GMAT) scores must be presented. A 3.0 undergraduate grade point average (on a 4.0 point scale), and a combined verbal and quantitative score of at least 295 on the GRE, or equivalent score on the GMAT, are desirable. Students must also submit transcripts from all higher education institutions attended, three letters of recommendation, and a personal statement, approximately one page in length, outlining their background, education and professional objectives.

Degree Requirements

The University's general degree requirements are discussed on the Graduate Policies and Procedures page.

To earn the Master of Science in Geospatial Information Sciences, students must complete a minimum of 36 semester credit hours of work beyond the prerequisites. Both tracks of the program involve the core requirement of 15 semester credit hours, and prescribed electives for 18 semester credit hours. The two tracks differ in their research requirements (3 semester credit hours). Students must achieve at least a 3.0 grade point average in the core requirement and an overall grade point average of 3.0 to graduate. Other courses may be substituted for those listed below with the written permission in advance of the Geospatial Information Sciences Program Head.

Program Core Requirement - Both Tracks: 15 semester credit hours

Students must earn a minimum grade point average (GPA) of 3.0 in the following courses:

- **GISC 6301** GIS Data Analysis Fundamentals
- **GISC 6317** GIS Programming Fundamentals
- **GISC 6325** Remote Sensing Fundamentals
- **GISC 6381** Geographic Information Systems Fundamentals
- **GISC 6384** Advanced Geographic Information Systems

Prescribed Electives (18 semester credit hours)

- **CS 6359** Object-Oriented Analysis and Design
- **CS 6360** Database Design
- **CS 6366** Computer Graphics
**CS 6384** Computer Vision

**GISC 5310** Hydrogeology

**GISC 5311** Applied Groundwater Modeling

**GISC 5322** GPS (Global Positioning System) Satellite Surveying Techniques

**GISC 5324** 3D Data Capture and Ground Lidar

**GISC 5330** Geospatial Applications in Earth Science

**GISC 5395** Satellite Geophysics and Applications

**GISC 6331** (CRIM 6332) GIS Applications in Criminology

**GISC 6334** (PPPE 6334) Workshop in Environmental and Health GIS/Policy

**GISC 6379** Special Topics in Geographic Information Sciences

**GISC 6382** Applied Geographic Information Systems

**GISC 6385** GIS Theories, Models, and Issues

**GISC 6387** Geospatial Sciences Workshop

**GISC 6388** Advanced GIS Programming

**GISC 7310** Advanced GIS Data Analysis

**GISC 7360** GIS Pattern Analysis

**GISC 7361** Spatial Statistics

**GISC 7363** Internet Mapping and Information Processing

**GISC 7364** Demographic and Epidemiological Analysis and Modeling

**GISC 7365** Advanced Remote Sensing

**GISC 8320** Geospatial Sciences Seminar

**MIS 6308** Systems Analysis and Project Management

**MIS 6320** Database Foundations

**MIS 6324** Business Intelligence Software and Techniques

**MIS 6326** Data Management

**PA 6318** Information Systems in Policy Environments

Choose one of the following Research Requirement Tracks:

**Research Requirement - Project Track:** 3 semester credit hours

**GISC 6389** Geospatial Information Sciences Master's Research

AND successfully defend a professional GIS Master's Project

**Research Requirement - Thesis Track:** 3 semester credit hours

**GISC 6V98** Master's Thesis
AND successfully defend a GIS Master's Research Thesis

Graduate Certificate in Geographic Information Systems (GIS): 15 semester credit hours

The School of Economic, Political and Policy Sciences offers a certificate in Geographic Information Systems for both novice and experienced GIScience professionals. Classes are offered through the state-of-the-art facilities housed within the Geospatial Information Sciences program in the School of Economic, Political and Policy Sciences. The certificate is available to both graduate degree-seeking and non-degree seeking students. The certificate requires 15 graduate semester credit hours (5 classes). All courses taken as part of this certificate also count toward the Master of Science in Geospatial Information Sciences degree, and can be taken in conjunction with the Graduate Certificate in Geospatial Intelligence and the Graduate Certificate in Remote Sensing.

Faculty

Professors: Carlos L. V. Aiken, Brian J. L. Berry, Denis J. Dean, John F. Ferguson, John W. Geissman, Daniel A. Griffith, Fang Qiu, Weili Wu, May Yuan
Associate Professors: Thomas H. Brikowski, Yongwan Chun, Dohyeong Kim, David J. Lary, Michael Tiefelsdorf
Assistant Professors: Anthony R. Cummings, Andrew Wheeler, Hejun Zhu
Senior Lecturers: Bryan Chastain, Irina Vakulenko

Admission Requirements

Students seeking the GIS Certificate must have completed an undergraduate degree. Students may complete and submit an application for admission online. Primary admissions requirements are: (1) an application to UT Dallas and (2) an undergraduate transcript. Applicants for the certificate program do not need a GRE (Graduate Record Examination) score or letters of reference for admission to the certificate program. They should apply as "non-degree seeking" students to the Geospatial Information Sciences program. Admissions requirements are the same for students who would simply like to take one or more of the related courses without pursuing certification. Up to 15 semester credit hours of coursework taken in the certificate program can be applied later in a graduate degree, if desired.

Registration by Current UT Dallas Students

Graduate students in any degree program within UT Dallas may register for GISC courses using standard registration procedures. Students should see their program advisor regarding degree plan credit assignment. Courses are listed under geospatial information sciences (GISC) in the UT Dallas class schedule with additional offerings under Geosciences (GEOS).

The Graduate Certificate in Geographic Information Science requires 15 semester credit hours earned through the following courses:

Two Required Courses (6 semester credit hours)

GISC 6381 (GEOS 6381) Geographic Information Systems Fundamentals
GISC 6384 (GEOS 6384) Advanced Geographic Information Systems
Two elective courses chosen from the following or as approved by the Director of the Certificate Program (6 semester credit hours)

- **GISC 5322 (GEOS 5322)** GPS (Global Positioning System) Satellite Surveying Techniques
- **GISC 5324 (GEOS 5324)** 3D Data Capture and Ground Lidar
- **GISC 6301** GIS Data Analysis Fundamentals
- **GISC 6317** GIS Programming Fundamentals
- **GISC 6325 (GEOS 5325)** Remote Sensing Fundamentals
- **GISC 6379** Special Topics in Geographic Information Sciences
- **GISC 6385 (GEOS 6385)** GIS Theories, Models and Issues
- **GISC 6388** Advanced GIS Programming
- **GISC 7310** Advanced GIS Data Analysis
- **GISC 7360** GIS Pattern Analysis
- **GISC 7361** Spatial Statistics
- **GISC 7363** Internet Mapping and Information Processing
- **GISC 7365 (GEOS 5326)** Advanced Remote Sensing

One Required Research Project Course (3 semester credit hours)

- **GISC 6387 (GEOS 6387)** Geospatial Sciences Workshop

Students should take this course with varied research topics if different certificate programs are pursued.

No more than two courses can be transferred from another institution. Courses for the certificate must be completed within a 3-year period with a minimum cumulative GPA of 3.0.

Graduate Certificate in Geospatial Intelligence (GeoInt): 15 semester credit hours

Geospatial Intelligence (GeoInt) is a rapidly evolving field that demands certain technical skill sets, the ability for individual rapid critical thinking, and a global awareness of supporting information for national security and other intelligence activities. This certificate program produces graduates that have met the requirements for such professionals set forth by the United States Geospatial Intelligence Foundation (USGIF). Classes are offered through the state of the art facilities housed within the Geospatial Information Sciences program in the School of Economic, Political and Policy Sciences. The certification requires 15 graduate semester credit hours (5 classes) detailed below. All courses taken as part of this certificate also count toward the Master of Science in Geospatial Information Sciences degree, and can be taken in conjunction with the Graduate Certificate in Geographic Information Systems and the Graduate Certificate in Remote Sensing.

Faculty

**Professors:** Carlos L. V. Aiken, Brian J. L. Berry, Denis J. Dean, John F. Ferguson, John W.
The mission of the Graduate Certificate in Geospatial Intelligence is to provide students with a broad set of skills in the areas of geographic information systems, remote sensing, geospatial statistical analysis, intelligence gathering, and global positioning systems. Courses will emphasize these skills along with the ability to find and interpret data, conduct accurate analysis, work in a professional and collaborative environment, and communicate effectively. UT Dallas geospatial intelligence certificate graduates will have demonstrated to the intelligence community that they have acquired the basic skills needed for employment in this high growth industry.

Registration by Current UT Dallas Students

Graduate students in any degree program within UT Dallas may register for GISC courses using standard registration procedures. Students should see their program advisor regarding degree-plan credit assignment. Courses are listed under geospatial information sciences (GISC) in the UT Dallas class schedule with additional offerings under Geosciences (GEOS) and Management Information Systems (MIS).

Required Coursework (15 semester credit hours)

Three required courses:

- GISC 6301 GIS Data Analysis Fundamentals
- GISC 6325 (GEOS 5325) Remote Sensing Fundamentals
- GISC 6381 (GEOS 6381) Geographic Information Systems Fundamentals

One elective course chosen from the following, or as approved by the Director of the certificate program:

- GISC 5322 (GEOS 5322) GPS (Global Positioning System) Satellite Surveying Techniques
- GISC 5324 (GEOS 5324) 3D Data Capture and Ground Lidar
- GISC 6317 GIS Programming Fundamentals
- GISC 6379 Special Topics in Geographic Information Sciences
- GISC 6384 (GEOS 6384) Advanced Geographic Information Systems
- GISC 6385 (GEOS 6385) GIS Theories, Models and Issues
- GISC 6388 Advanced GIS Programming
- GISC 7310 Advanced GIS Data Analysis
- GISC 7360 GIS Pattern Analysis
GISC 7361 Spatial Statistics
GISC 7363 Internet Mapping and Information Processing
GISC 7365 (GEOS 5326) Advanced Remote Sensing
GISC 7366 (GEOS 5329) Applied Remote Sensing
GISC 7387 GIS Research Design
MIS 6320 Database Foundations
MIS 6324 Business Intelligence Software and Techniques
MIS 6360 Agile Project Management

One required research project course:
GISC 6387 (GEOS 6387) Geospatial Sciences Workshop

Students should take this course with varied research topics if different certificate programs are pursued.

No more than two courses can be transferred from another institution. Courses for the certificate must be completed within a 3-year period with a minimum cumulative GPA of 3.0.

Graduate Certificate in Remote Sensing: 15 semester credit hours
The Remote Sensing Certificate is administered jointly by the School of Economic, Political and Policy Sciences and the Department of Geosciences in the School of Natural Sciences and Mathematics. The American Society for Photogrammetry and Remote Sensing (1997) defines remote sensing as the art, science, and technology of obtaining reliable information about physical objects and the environment through the process of recording, measuring and interpreting imagery and digital representations of energy patterns derived from non-contact sensor systems. Remote sensing involves a powerful set of computerized software and hardware, and sophisticated mathematical, statistical and logical techniques for extraction and presentation of information acquired via non-contact sensors. It provides reliable and cost-effective means of studying the Earth's surface for urban planning, natural resources management and protection, and a wide variety of other fields. Government and non-government organizations continuously seek qualified professionals to use remote sensing for a wide range of applications.

Faculty
Professors: Carlos L. V. Aiken, Brian J. L. Berry, Denis J. Dean, John F. Ferguson, Daniel A. Griffith, Fang Qiu, Robert J. Stern, Weili Wu, May Yuan
Associate Professors: Thomas H. Brikowski, Yongwan Chun, Dohyeong Kim, David J. Lary, Michael Tiefelsdorf
Senior Lecturers: Bryan Chastain, Irina Vakulenko

Admission Requirements
Students seeking the Remote Sensing certificate must have completed an undergraduate degree. Students may complete and submit an application for admission online. Primary admission requirements are: (1) an application to UT Dallas, and (2) an
undergraduate transcript. Applicants for the certificate program do not need a GRE (Graduate Record Examination) score or letters of reference for admission. Students should apply as "non-degree seeking" students to the Geospatial Information Sciences program. Admission requirements for these students are similar to admission requirements for those students who would simply like to take one or more of the related courses without pursuing a certificate. Up to 15 semester credit hours of course work taken in the certificate program can be applied later to a graduate degree, if desired.

Registration by Current UT Dallas Students

Graduate students in any degree program within UT Dallas may register for GISC courses using standard registration procedures. Students should see their program advisor regarding degree-plan credit assignment. Courses are listed under geospatial information sciences (GISC) in the UT Dallas class schedule with additional offerings under Geosciences (GEOS) and Management Information Systems (MIS).

Required Coursework (15 semester credit hours)

Two required courses:

- **GISC 6325 (GEOS 5325)** Remote Sensing Fundamentals
- **GISC 7365 (GEOS 5326)** Advanced Remote Sensing

Two elective course chosen from the following, or as approved by the Director of the certificate program:

- **GISC 5322 (GEOS 5322)** GPS (Global Positioning System) Satellite Surveying Techniques
- **GISC 5324 (GEOS 5324)** 3D Data Capture and Ground Lidar
- **GISC 6301** GISC Data Analysis Fundamentals
- **GISC 6317** GISC Programming Fundamentals
- **GISC 6379** Special Topics in Geographic Information Sciences
- **GISC 6381 (GEOS 6381)** Geographic Information Systems Fundamentals
- **GISC 6384 (GEOS 6384)** Advanced Geographic Information Systems
- **GISC 6385 (GEOS 6385)** GIS Theories, Models and Issues
- **GISC 6388** Advanced GIS Programming
- **GISC 7310** Advanced GIS Data Analysis
- **GISC 7360** GIS Pattern Analysis
- **GISC 7361** Spatial Statistics
- **GISC 7363** Internet Mapping and Information Processing
- **GISC 7387** GIS Research Design
One required research project course:

**GISC 6387 (GEOS 6387)** Geospatial Sciences Workshop

Students should take this course with varied research topics if different certificate programs are pursued.

No more than two courses can be transferred from another institution. Courses for the certificate must be completed within a 3-year period with a minimum cumulative GPA of 3.0.

1. Individuals experienced with GIS may have the introductory course (GISC 6381) waived at the discretion of the Geospatial Information Sciences Program Head, but must take an additional course from the prescribed specialization elective courses listed above.

2. Individuals experienced with GIS may have the introductory course (GISC 6381) waived at the discretion of the program head, but must take an additional course from the elective courses listed in this certificate program.

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