

# GIS: Geographic Information Science Courses

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## Courses

GIS 3015 Cartographic Skills

3 sh (may not be repeated for credit)

Prerequisite: GEO 1200/L OR GLY 2010/L OR ESC 2000/L

Co-requisite: GIS 3015L

Designed to teach students the basics of maps, including map projections, datums, grid systems, map interpretations, elements of map design, and basic field mapping. Material and supply fee will be assessed for corresponding lab. Credit cannot be received for both GEO 3100 and GIS 3015.

GIS 3015L Cartographic Skills Lab

1 sh (may not be repeated for credit)

Prerequisite: GIS 3015\*

Co-requisite: GIS 3015

Corresponding lab for Cartographic Skills.

GIS 3905 Directed Study

1-12 sh (may be repeated indefinitely for credit)

GIS 4006 Computer Cartography

3 sh (may not be repeated for credit)

Co-requisite: GIS 4006L

The course focuses on the fundamentals of cartography, spatial statistics, thematic mapping techniques, and web based mapping. Students will gain an inter-disciplinary understanding of cartographic representation and visualization with hands on applications using cutting edge GIS and graphic design software to create purpose tailored maps. Upon successful completion of this course, students will be able to interpret and appropriately communicate spatial data; will have developed a personalized cartographic style; will have created a professional GIS portfolio for current/potential employers; and most importantly will have developed a keen appreciation for maps and spatial awareness.

GIS 4006L Computer Cartography Lab

1 sh (may not be repeated for credit)

Co-requisite: GIS 4006

The course focuses on the fundamentals of cartography, spatial statistics, thematic mapping techniques, and web based mapping. Students will gain an inter-disciplinary understanding of cartographic representation and visualization with hands on applications using cutting edge GIS and graphic design software to create purpose tailored maps. Upon successful completion of this course, students will be able to interpret and appropriately communicate spatial data; will have developed a personalized cartographic style; will have created a professional GIS portfolio for current/potential employers; and most importantly will have developed a keen appreciation for maps and spatial awareness. Prior to enrollment, students should be competent with Windows operating system including: storage, copying and management of multiple data types, managing multiple windows and applications, and discipline to save work frequently; basic competence with ArcGIS and Microsoft Excel is recommended.

GIS 4035 Photo Interpretation and Remote Sensing

3 sh (may not be repeated for credit)

Prerequisite: GIS 4043\*/L\*

Applied skills emphasizing the fundamentals of aerial photograph interpretation and basics of multiband spectral reconnaissance of the environment-multispectral photography, infrared, microwave scanning and multifrequency radar systems. Application includes their uses in the study of cultural and biophysical phenomena. Material and supply fee will be assessed for corresponding lab.

GIS 4035L Photo Interpretation and Remote Sensing Lab

1 sh (may not be repeated for credit)

Prerequisite: GIS 4035\*

Co-requisite: GIS 4035

Corresponding lab for Photo Interpretation and Remote Sensing.

GIS 4036 Applications in Remote Sensing

3 sh (may not be repeated for credit)

Prerequisite: GIS 4035/L

The purpose is to make students familiar with digital image processing methods and techniques as applied in solving environmental and urban problems. The course is divided into four basic components: introduction of the generic process of remote sensing applications, introduction of some advanced digital image processing techniques and methods, case studies illustrating this process, and student projects using this process. Offered concurrently with GIS 5039; graduate students will be assigned additional work. Material and supply fee will be assessed. Permission is required.

GIS 4043 Geographic Information Systems

3 sh (may not be repeated for credit)

Co-requisite: GIS 4043L

Spatial database will be queried to solve spatial problems, analyze related attributes, and produce computerized cartographic output. Examines spatial data structures, data acquisition, processing, management, manipulation, and analysis for interdisciplinary applications and research. Permission is required. Material and Supply Fee will be assessed for corresponding lab. Credit cannot be received for both GIS 4043 and GEO 4151.

GIS 4043L GIS Laboratory

1 sh (may not be repeated for credit)

Co-requisite: GIS 4043

This course teaches fundamental concepts and techniques of Geographic Information Systems (GIS). It covers basic concepts such as map projections, spatial data models, relational databases, spatial analysis, and visualization of spatially distributed data and phenomena. By the end of the course, students are expected to have an understanding of elementary GIS theory, working knowledge of ArcGIS, and the ability to develop GIS-based solutions to geographic modeling and analysis tasks. For most exercises, students will use real-world GIS data in order to learn how to overcome typical problems encountered by GIS practitioners. The last three weeks of the course will focus on the development, execution and presentation of a final GIS project. Prior to enrollment, students should be competent with Windows operating system including: storage, copying and management of multiple data types, managing multiple windows and applications, and saving files to local drives; a basic familiarity with Microsoft Excel, Word, and PowerPoint. Materials and Supply fee will be assessed.

GIS 4048 Applications in Geographic Information Systems  
3 sh (may not be repeated for credit)  
Prerequisite: GIS 4043/L

The Applications in GIS course strives to provide a balance between the "how-to" of using ArcGIS 10 and the "why" of GIS by explaining the roles GIS technology plays in analyzing local, regional, and international problems. The course builds upon topics covered in Introduction to GIS (GIS 4043). Major components of the course include computer representation of geographic information, the construction of GIS databases, spatial analysis with GIS, application areas of GIS, and management issues that concern GIS. Examples include the study of geohazards, natural disasters, urban planning, homeland security/law enforcement, and marketing or location decisions. Laboratory exercises, case studies and course projects use true-to-life datasets to solve real-world problems. Offered both as a stand-alone course online and concurrently with GIS 5100 at the Pensacola Campus where graduate students will be assigned additional work. Permission is required. Material and supply fee will be assessed. Credit cannot be received for both GIS 4048 and GEO 4152. Basic competency with ArcGIS software is required. Prior coursework including Introduction to GIS (GIS 4043 with lab) is recommended.

GIS 4071 Methods and Techniques in Environmental Resource Management and Planning  
3 sh (may not be repeated for credit)  
Prerequisite: GIS 4043/L

Tools, methods, and techniques employed in the study of environmental impact and resource management. Research fundamentals studied and applied to environmental problems such as land use, environmental impact studies, Florida's development of regional impact, resource evaluation, and other topics.

GIS 4102 GIS Programming  
3 sh (may not be repeated for credit)  
Prerequisite: GIS 4043/L

In today's technology driven world we are fortunate to have access to many tools with which to analyze and explore digital spatial data. During this course students will learn to use programming techniques to create applications that perform fundamental spatial analysis and automation tasks, such as geoprocessing, editing, database management, projecting data, and map creation. The course will focus primarily on using the Python programming language within the context of Esri's desktop GIS environment. Offered as a stand-alone course online and concurrently with GIS 5103 where graduate students will be assigned additional work. Permission required. Credit may not be received in both GIS 4102 and GIS 5103.

GIS 4260 GIS Applications for Archaeology  
3 sh (may not be repeated for credit)  
Prerequisite: GIS 4043/L

This course will serve as an introduction to archaeological applications of GIS technology and data management and analysis. Students will learn how to compile, transform, analyze and present sources of archaeological and historical data, and will utilize this information in GIS for cultural resources interpretation, management and predictive modeling. Additionally, this course is designed to reinforce best practices for collecting spatially-related data on anthropological archaeology projects. Restricted to students in the online GIS Certificate Program. Basic competency with ArcGIS software is required. Prior coursework including GIS4043 with Lab Introduction to GIS is recommended.

GIS 4905 Directed Study  
1-12 sh (may be repeated indefinitely for credit)

GIS 4930 Special Topics in Geographic Information Science  
3 sh (may be repeated for up to 6 sh of credit)  
Prerequisite: GIS 4043/L

The Special Topics in GIS course examines scientific methods used to derive useful information from spatial data in real-world situations. We will visit various problems faced by GIS managers and analysts. Students can expect to conduct research, plan projects, import and process various types of data in a GIS, analyze and explore data based on commonly accepted methods, and report conclusions and present results where various formats are explored. Offered as both a stand alone course online and concurrently with GIS 5935 at Pensacola campus where graduate students will be assigned additional work. Permission is required. Material and supply fee will be assessed. Basic competency with ArcGIS software is required. Prior coursework including GIS 4043, GIS 4048 and GIS 4102 is recommended.

GIS 4938 Special Topics in GIS for Archaeology  
3 sh (may not be repeated for credit)  
Prerequisite: GIS 4260

This course will serve as an advanced approach to archaeological applications of GIS technology and data management and analysis. Students will learn how to compile, transform, analyze and present sources of archaeological and historical data, and will utilize this information in GIS for cultural resources interpretation, management and predictive modeling. Additionally, this course is designed to reinforce best practices for collecting spatially-related data on anthropological archaeology projects. Restricted to the online GIS Certificate program. Basic competency with ArcGIS software is required. Prior coursework including GIS 4043, GIS 4260 and GIS 4102 is recommended. Offered concurrently with GIS 5938; graduate students will be assigned additional work.

GIS 4944 GIS Internship  
1-3 sh (may not be repeated for credit)  
Prerequisite: GIS 4043/L

Supervised application of Geographic Information Science (GIS) in business, government, non-profit, educational or other environmental organizations. Offered concurrently with GIS 5945; graduate students will be assigned additional work. Permission is required.

GIS 5007 Computer Cartography  
3 sh (may not be repeated for credit)  
Co-requisite: GIS 5007L

The course focuses on the fundamentals of cartography, spatial statistics, thematic mapping techniques, and web based mapping. Students will gain an inter-disciplinary understanding of cartographic representation and visualization with hands on applications using cutting edge GIS and graphic design software to create purpose tailored maps. Upon successful completion of this course, students will be able to interpret and appropriately communicate spatial data; will have developed a personalized cartographic style; will have created a professional GIS portfolio for current/potential employers; and most importantly will have developed a keen appreciation for maps and spatial awareness.

GIS 5007L Computer Cartography Lab  
1 sh (may not be repeated for credit)  
Co-requisite: GIS 5007

The course focuses on the fundamentals of cartography, spatial statistics, thematic mapping techniques, and web based mapping. Students will gain an inter-disciplinary understanding of cartographic representation and visualization with hands on applications using cutting edge GIS and graphic design software to create purpose tailored maps. Upon successful completion of this course, students will be able to interpret and appropriately communicate spatial data; will have developed a personalized cartographic style; will have created a professional GIS portfolio for current/potential employers; and most importantly will have developed a keen appreciation for maps and spatial awareness. Prior to enrollment, students should be competent with Windows operating system including: storage, copying and management of multiple data types, managing multiple windows and applications, and discipline to save work frequently; basic competence with ArcGIS and Microsoft Excel is recommended.

GIS 5027 Aerial Photography and Remote Sensing  
3 sh (may not be repeated for credit)

This course is designed to familiarize students with the fundamentals of remote sensing and photo interpretation through hands-on techniques with aerial photographs and satellite imagery based on real-world applications. Both active and passive sensors will be discussed in lecture. The course is broken up into two distinct sections ? the first five weeks are spent interpreting digital aerial photographs; the rest of the semester is spent examining and manipulating digital data from satellites and other remote sensors. The lecture will focus on the history, technology, concepts, processes, and applications of Aerial Photography and Remote Sensing. Please consult with the course instructor for any questions regarding these prerequisite concepts. Introduction to GIS, GIS4043 or GIS5050 with Lab is recommended prerequisite. Offered concurrently with GIS 4035, graduate students will be assigned additional work.

GIS 5027L Aerial Photography and Remote Sensing Lab  
1 sh (may not be repeated for credit)  
Prerequisite: GIS 5027\*  
Co-requisite: GIS 5027

This course is designed to familiarize students with the fundamentals of remote sensing and photo interpretation through hands-on techniques with aerial photographs and satellite imagery based on real-world applications. Both active and passive sensors will be discussed in lecture. The course is broken up into two distinct sections ? the first five weeks are spent interpreting digital aerial photographs; the rest of the semester is spent examining and manipulating digital data from satellites and other remote sensors. The lab will focus on techniques for the practical use of digital aerial photography and satellite imagery using both Erdas Imagine and ESRI ArcGIS. The labs are structured to complement the material and readings assigned in lectures. Please consult with the course instructor for any questions regarding these prerequisite concepts. Introduction to GIS, GIS4043 or GIS5050 with Lab is recommended prerequisite. Offered concurrently with GIS 4035, graduate students will be assigned additional work.

GIS 5039 Applications in Remote Sensing  
3 sh (may not be repeated for credit)

The purpose is to make students familiar with digital image processing methods and techniques as applied in solving environmental and urban problems. The course is divided into four basic components: introduction of the generic process of remote sensing applications, introduction of some advanced digital image processing techniques and methods, case studies illustrating this process, and student projects using this process. Offered concurrently with GIS 4036; graduate students will be assigned additional work. Material and supply fee will be assessed. Permission is required. Credit cannot be received for both GIS 5039 and GEO 5139.

GIS 5050 Geographic Information Systems  
3 sh (may not be repeated for credit)  
Co-requisite: GIS 5050L

This course teaches fundamental concepts and techniques of Geographic Information Systems (GIS). It covers basic concepts such as map projections, spatial data models, relational databases, spatial analysis, and visualization of spatially distributed data and phenomena. The applications of GIS are presented. Future issues for GIS and state-of-the-art technology are also discussed. Cross listed with GIS 4043; Graduate students will be assigned additional work.

GIS 5050L Geographic Information Systems Lab  
1 sh (may not be repeated for credit)  
Prerequisite: GIS 5050\*  
Co-requisite: GIS 5050

This course teaches fundamental concepts and techniques of Geographic Information Systems (GIS). It covers basic concepts such as map projections, spatial data models, relational databases, spatial analysis, and visualization of spatially distributed data and phenomena. By the end of the course, students are expected to have an understanding of elementary GIS theory, working knowledge of ArcGIS, and the ability to develop GIS?based solutions to geographic modeling and analysis tasks. For most exercises, students will use real-world GIS data in order to learn how to overcome typical problems encountered by GIS practitioners. The last three weeks of the course will focus on the development, execution and presentation of a final GIS project. Prior to enrollment, students should be competent with Windows operating system including: storage, copying and management of multiple data types, managing multiple windows and applications, and saving files to local drives; a basic familiarity with Microsoft Excel, Word, and PowerPoint. Cross listed with GIS 4043L; Graduate students will be assigned additional work. Materials and Supply fee will be assessed.

GIS 5100 Applications in Geographic Information Systems  
3 sh (may not be repeated for credit)

The Applications in GIS course strives to provide a balance between the "how-to" of using ArcGIS 10 and the "why" of GIS by explaining the roles GIS technology plays in analyzing local and regional (even global) problems. The course builds upon topics covered in Introduction to GIS (GIS 4043). Major components of the course include computer representation of geographic information, the construction of GIS databases, spatial analysis with GIS, application areas of GIS, and social and management issues that concern GIS. A generic process for applying GIS techniques in problem solving is introduced, and several case studies of GIS applications in environmental and social domains will be analyzed. Offered both as a stand-alone course online and concurrently with GIS 4048 on the Pensacola Campus where graduate students are assigned additional work. Material and supply fee will be assessed. Credit cannot be received for both GIS 5100 and GEO 5157. Basic competency with ArcGIS software is required. Prior coursework including Introduction to GIS (GIS 4043 or GIS 5050 with lab) is recommended.

GIS 5103 GIS Programming  
3 sh (may not be repeated for credit)

In today's technology driven world we are fortunate to have access to many tools with which to analyze and explore digital spatial data. During this course students will learn to use programming techniques to create applications that perform fundamental spatial analysis and automation tasks, such as geoprocessing, editing, database management, projecting data, and map creation. The course will focus primarily on using the Python programming language within the context of Esri's desktop GIS environment. Offered as a stand-alone course online and concurrently with GIS 4102 where graduate students will be assigned additional work. Permission is required. Credit may not be received in both GIS 5103 and GIS 4102. Basic competency with ArcGIS software is required. Completion of GIS4043 with Lab or GIS5050 with lab is recommended.

GIS 5265 GIS Applications for Archaeology  
3 sh (may not be repeated for credit)

This course will serve as an introduction to archaeological applications of GIS technology and data management and analysis. Students will learn how to compile, transform, analyze and present sources of archaeological and historical data, and will utilize this information in GIS for cultural resources interpretation, management and predictive modeling. Additionally, this course is designed to reinforce best practices for collecting spatially-related data on anthropological archaeology projects. Restricted to students in the online GIS Certificate program. Basic competency with ArcGIS software is required. Prior coursework including Introduction to GIS (GIS 4043 or GIS 5050 with lab) is recommended.

GIS 5935 Special Topics in Geographic Science  
3 sh (may be repeated for up to 6 sh of credit)

Geographic information systems (GIS) today are being used by everyone from scientists to everyday citizens to solve geographic problems ranging from the very simple to the extremely complex. As the use of GIS and the availability of digital data increase, GIS users need to be aware of how the data being put into a GIS affects the reliability of the information products being produced from a GIS. Producing new and useful information from spatial data requires a thorough understanding of their limitations and the methods used to process them. Students explore GIS theory and practice related to the visualization, measurement, transformation, and optimization of spatial data. An underlying theme that uncertainty is an inherent characteristic of spatial data is thoroughly examine and students learn how to identify it, measure it, and live with it. By the end of this course, students will have gained extensive knowledge about various GIS analysis techniques, methods, outputs and uncertainties as they relate to specific problems experienced by many cities (large and small) around the world. Combining lessons learned in previous GIS courses with more in-depth techniques presented in this course gives students the opportunity to piece together previous knowledge and gain a greater sense of understanding for what it means to conduct GIS Science. Offered as both a stand alone course online and concurrently with GIS 4930 at the Pensacola Campus where graduate students will be assigned additional work. Permission is required. Material and supply fee will be assessed. Competency with GIS topics and ArcGIS software is required. Prior coursework including GIS4043 or GIS5050, GIS 5100 and GIS 5103 are recommended.

GIS 5938 Special Topics in GIS for Archaeology  
3 sh (may not be repeated for credit)  
Prerequisite: GIS 5265

This course will serve as an advanced approach to archaeological applications of GIS technology and data management and analysis. Students will learn how to compile, transform, analyze and present sources of archaeological and historical data, and will utilize this information in GIS for cultural resources interpretation, management and predictive modeling. Additionally, this course is designed to reinforce best practices for collecting spatially-related data on anthropological archaeology projects. Restricted to students in the online GIS Certificate program. Offered concurrently with GIS 4938; graduate students will be assigned additional work. Competency with ArcGIS software is required. Prior coursework including GIS 4043 or GIS 5050 with lab and GIS5265 is recommended.

GIS 5945 GIS Internship  
1-3 sh (may not be repeated for credit)

Supervised application of Geographic Information Science (GIS) in business, government, non-profit, educational, or other environmental organizations. Offered concurrently with GIS 4944; graduate students will be assigned additional work. Permission is required.

GIS 6005 Communicating GIS  
3 sh (may not be repeated for credit)

This course begins with the basic theory of graphic design, cartography, and map production and distribution. Students then learn to communicate specific types of spatial and analytical information through maps, written and oral explanations, graphs, tables, charts, and interactive web mapping applications. Course includes lecture, hands-on exercises, written reports, and a final presentation. Restricted to students majoring in MS GIS Administration program, it is best taken during one of the first three semesters. Basic competency in GIS concepts and software is expected.

GIS 6105 Spatial Data Management  
3 sh (may not be repeated for credit)

This course begins with the basic theory of database design. It then proceeds on to incorporate spatial data and its unique data management requirements. Students then learn how to extract, transform and load spatial data and its associated attribute data using specific GIS case study workflows. Course includes lecture, hands-on exercises, written reports, and a final project with a presentation requirement. Prior coursework in Introduction to GIS and GIS Programming is recommended.

GIS 6110 Advanced Topics in Geographic Information Science  
3 sh (may not be repeated for credit)

This class brings together a number of open source GIS tools in order to educate students on the methods and processes behind web-based geographic information systems (Web GIS). Specifically, we will review techniques with spatial databases, web mapping application programming interfaces (APIs), geospatial scripting and theories of map interaction within the context of Web GIS. In order to achieve this near-complete picture of how Web GIS works use a pattern of software architecture known as model-view-controller or MVC. Finally, we will cover design considerations for Web GIS within browsers on mobile devices. Material and supply fee will be assessed. Credit cannot be received for both GIS 6110 and GEO 6159. Competency with the principles of GIS and ArcGIS software is required. Prior upper-level GIS course work (GIS 5100, GIS 5935, GIS 5103) is recommended.

GIS 6555 Geographic Information Systems Management  
3 sh (may not be repeated for credit)  
Prerequisite: GIS 5935

This course provides practical information on the development, implementation, and operation of GIS programs and projects intended for both seasoned and aspiring GIS managers. The course focuses on planning and implementing GIS solutions for government agencies and contractors. The course combines lecture, discussion, and group exercises. An end of term project involves writing in response to real or hypothetical solicitations for a project that targets GIS tool development, implementation, and/or training to support management activities in local, regional, state, national, or international contexts. Restricted to students in MS GIS Administration program and is best completed before enrolling in GIS 6110 Advanced Topics in GIS.

GIS 6905 Directed Study  
1-12 sh (may be repeated indefinitely for credit)

GIS 6955 GIS Capstone  
3 sh (may be repeated for up to 6 sh of credit)  
Prerequisite: GIS 6005 AND GIS 6110 AND GIS 6555

A final capstone experience for students who are nearing completion of their MS GIS Administration program. Prior to enrollment, students must submit a capstone intention form to program faculty outlining their project idea, relevant research, potential client(s), and review committee members. Upon faculty approval, the student may enroll in capstone and begin writing a draft project proposal, including a literature review for committee review. By the end of the first semester, students are expected to have completed a final proposal and gain approval from their review committee before enrolling in the second capstone course. The second semester of capstone is dedicated to carrying out the project and presenting findings and/or products in the form of (at least) a paper and presentation. Students work in collaboration with local partners, faculty, or the student's current employer to develop a real-world GIS application. Working independently, students: communicate with project partners to identify project goals; acquire and prepare spatial data for GIS data analysis; communicate with project partners to assess progress; manage spatial data; and produce necessary outputs for presentation as part of a final report. This final project should affirm the student's ability to think critically and creatively, to solve practical problems, to make reasoned and ethical decisions, and to communicate effectively. The capstone course serves as documentation of the student's personal mastery of professional competencies. It is designed to be an integrative experience for MS GIS Administration students. Course is restricted to students in their last two semesters of the MS GIS Administration program.

\* This course may be taken prior to or during the same term.