

Fall 2009 Syllabus
GIS4930/5935 Special Topics in GIS
(For Online GIS Certificate Program)

Instructor

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Course Description

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 increases, 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.

This course examines the scientific methods used to derive useful information from spatial data. Students explore GIS theory 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 examined and students learn how to identify it, measure it, and live with it.

Learning Outcomes

Those completing this course will be able to

- Describe what spatial data are and how information is derived from them.
- Identify how to best represent spatial data.
- Assess the nature of spatial data and techniques of spatial autocorrelation, sampling, and interpolation.
- Understand how uncertainty in spatial data is propagated through the conception, measurement, and analysis of geographic phenomena.
- Comprehend how GIS-based visualization allows users to derive information, interact with spatial data, and represent attributes and spatial objects.
- Query and measure spatial and other attribute data.
- Perform spatial overlays, interpolation, and density estimations in order to transform spatial data into meaningful information.
- Produce statistical summaries of spatial data.
- Conduct optimization studies with spatial data to identify desired point locations and routes.
- Understand the rationale of and methods for spatial hypothesis testing.
- Assess the uncertainties associated with spatial data.

Topics Covered

- Topic 1 - Basics of Data and Information: Representing geography; The nature of geographic data; Creating and visualizing information; Uncertainty
- Topic 2 - Cartography, Map Production, and Geovisualization: GIS-based visualization; Representing attributes and spatial objects; Scientific visualization; Advanced methods for improving visualizations
- Topic 3 - Query and Measurement: Querying views of a GIS; Advanced queries; Querying for measurements
- Topic 4 - Transformations and Descriptive Summaries: Buffering, point-in-polygon, and polygon overlay; Spatial interpolation and density estimation; Centers and dispersion; Histograms, pie charts, and scatterplots; Spatial dependence and fragmentation
- Topic 5 - Optimization and Hypothesis Testing: Optimization; Hypothesis testing
- Topic 6 - Uncertainty: Measuring uncertainty of nominal and ordinal values; Measuring uncertainty of interval or ratio values; Uncertainty issues for spatial data

Credit Hours: 3

Prerequisite

GIS 4035/L (Intro GIS/Lab), GIS 4043 (Applications in GIS)

Co-requisites: None

Course Format

This is an e-learning course for Online GIS Certificate Program. Access to Internet is a must. Learning activities and interactions with the instructor are Internet-based. Learning and assessment activities include:

- *Readings* will use both traditional paper textbook (optional) and online material.
- *GIS lab exercises* using ESRI (Environmental Systems Research Institute)'s ArcGIS® software (ArcView®, ArcEditor™, or ArcInfo®) are an essential part of the course. For GIS labs, students will use material from [ESRI Virtual Campus](#) to which UWF has subscribed. Each student will be assigned an access code when the class begins. Students must read the theory and concept part relating to each topic before doing labs. For some labs, in addition to completing the tasks in the virtual campus course, students are required to conduct additional challenging analyses using the existing lab data or derived data.
- *Online discussion* of selected topics will use the text book material and online GIS journal papers.
- *Mini-projects*: Students are required to complete two assigned mini-projects involving GIS spatial analyses.
- *Topic quiz*: After completing a topic, a quiz will be monitored to assess students' understanding of the concepts relating to the topic. Quiz questions are designed based on ESRI online campus reading material.
- *Lab quiz/map layout production*: To monitor if students have successfully completed a GIS lab, students will need to take a quiz including several questions

relating to the lab analysis results or create a map layout visualizing the result. A map must be converted to a BMP image file for submission to the drop box.

- *Course project.* You need to conduct a course project after you finish all the six course modules. The project will use real data from your instructor's research project to examine the health effect of fine particulate matter (PM) in the air. The data include satellite image, US EPA data, and stroke mortality data from CDC. You are going to apply a series of GIS and spatial analysis techniques you have learned in the course to explore the relationship between fine aerosol optical depth and PM as well as stroke mortality.

Text Book (Not required):

Paul A. Longley, Michael F. Goodchild, David J. Maguire, and David W. Rhind, 2005. *Geographic Information Systems and Science, Second Edition.* John Wiley & Sons.

Software Requirements

To complete course exercises, you need **one** of the following:

Product	Version
ArcView	9.3.1
ArcEditor	9.3.1
ArcInfo	9.3.1

AND the following software product:

Product	Version
ArcGIS Spatial Analyst	9.3

Before beginning this course, be sure that your ArcGIS® software (ArcView®, ArcEditor™, or ArcInfo®, and Spatial Analyst) is working properly. If you are not sure, check with our online GIS certificate administrator Amber Bloechle (abloechle@uwf.edu). All students enrolled in our Online GIS Certificate Program are to access required software via UWF eDesktop for GIS.

Assessment

All work must be submitted by the due date. Late submission will be rejected by the system. Grades are given based on the percent points earned and the UWF grading scale. Total points are 300. Percent points may be rescaled depending upon the average performance of the class.

Points are distributed as:

Topic quizzes	110 points (1 for each question)
Lab quizzes/map product	78 points (10 for Lab 1 map production, 2 for each quiz question)
Online discussion	30 points (5 for each)
Mini-project quizzes	32 points (4 for each)
Course project	50 points

Grading Scale		
Letter Grade	UWF Scale Quality Points	Grade
A	4	93% +
A-	3.7	90 < 93%
B+	3.3	87 < 90%
B	3	83 < 87%
B-	2.7	80 < 83%
C+	2.3	77 < 80%
C	2	73 < 77%
C-	1.7	70 < 73%
D+	1.3	67 < 70%
D	1	60 < 67%
F	0	< 60%

Special Technology Utilized by Students: This course is totally online. All instructional content and interaction takes place over the WWW. In addition to baseline word processing skills and sending/receiving email with attachments, students will be expected to search the internet and upload / download files. In addition, students **may** need one or more of the following plug-ins:

- Adobe Acrobat Reader:
<https://argomail.uwf.edu/exchweb/bin/redirect.asp?URL=http://www.adobe.com/products/acrobat/readstep2.html>
- PowerPoint Viewer:
<https://argomail.uwf.edu/exchweb/bin/redirect.asp?URL=http://microsoft.com/downloads/details.aspx?FamilyId=D1649C22-B51F-4910-93FC-4CF2832D3342%26displaylang=en>
- Windows Media Player:
<https://argomail.uwf.edu/exchweb/bin/redirect.asp?URL=http://www.microsoft.com/windows/windowsmedia/download/>
- QuickTime Player:
<https://argomail.uwf.edu/exchweb/bin/redirect.asp?URL=http://www.apple.com/quicktime/download/>
- Real Player:
<https://argomail.uwf.edu/exchweb/bin/redirect.asp?URL=http://forms.real.com/netzip/getrde601.html?h=207.188.7.150%26f=windows/RealOnePlayerV2GOLD.exe%26p=RealOne%2BPlayer%26oem=dl%26tagtype=ie%26type=dl>
- Macromedia Flash Player:
http://macromedia.com/shockwave/download/download.cgi?P1_Prod_Version=ShockwaveFlash

Expectations for Academic Conduct/Plagiarism Policy:

Academic Conduct Policy: ([Web Format](#)) | ([PDF Format](#)) | ([RTF Format](#))

Plagiarism Policy: ([Word Format](#)) | ([PDF Format](#)) | ([RTF Format](#))

Student Handbook: ([PDF Format](#))

ASSISTANCE:

Students with special needs who require specific examination-related or other course-related accommodations should contact Barbara Fitzpatrick, Director of Disabled Student Services (DSS),

<https://argomail.uwf.edu/exchweb/bin/redirect.asp?URL=http://hostsited21.uwf.edu/content/enforce/d/67682-DEVELOP.ZhiyongHu.zhu/mailto:dss@uwf.edu>, (850) 474-2387. DSS will provide the student with a letter for the instructor that will specify any recommended accommodations.