

NR 6910

GIS for Natural Resource Applications

Spring Semester 2015
3 credits, Online Delivery

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Course Description

The course is designed for graduate students who need an introduction to GIS software and applications. No prior GIS experience is needed, but familiarity with natural resources spatial issues is assumed. Students will use the ESRI software ArcGIS 10 for all course exercises. Students will learn how to acquire geospatial data from various web sources as well as develop an understanding of how spatial data is created and how to implement field collected data in ArcGIS. Spatial data will be used to develop maps and conduct basic to advanced spatial analyses relevant to natural resource issues.

Course Objectives

To gain comfort using basic tools in ArcGIS

- To create evaluative habits: data, tools functions, results
- To become familiar with web-based GIS resources
- To develop skills in spatial analyses and spatial thinking

To gain a fundamental understanding of spatial data models

- To understand how data accuracy and precision can limit real world applications
- To understand how spatial data is connected to place
- To understand theoretical geospatial principles underlying GIS practices

To effectively display spatial data and convey results of GIS analyses

Course Curriculum

The course is composed of 10 modules spanning the 15 week semester

- Module 1 Introduction to ArcGIS and basic cartography
- Module 2 Mapping with GIS data: classification and symbolization
- Module 3 Understanding spatial data
- Module 4 Coordinate systems, datums, projections
- Module 5 Data Creation: Digitizing & Georeferencing; mapping land use change
- Module 6 Case Study: Spotted skunk habitat delineation (basic geoprocessing)
- Module 7 Working with DEMs
- Module 8 Case Study: Emergency response (advanced geoprocessing)
- Module 9 Case Study: Comparative watershed study
- Module 10 Case Study: Habitat suitability modeling

Course Materials

Canvas: The course will use Canvas (<https://online.usu.edu/>) for course announcements, assignment delivery and submission, quizzes, discussions, grades, etc. It is the student's responsibility to log in to and utilize the Canvas system. Help using the Canvas system can be obtained by contacting USU Information Technologies at 797-HELP or going to <http://it.usu.edu>.

Software: The ESRI education edition software package (a one year free trial of ArcGIS 10.2) will be made available to all students enrolled in the class.

Hardware: Students will need access to a computer with the following system requirements:

Windows OS (8, 7, Vista, XP preferred, 2008/2003 will also work)
CPU Speed 2.2 GHz minimum
Memory/RAM 2 GB *minimum* (4 GB would be better)
Disk space 5 GB minimum

Please see: <http://resources.arcgis.com/content/arcgisdesktop/10.0/arcgis-desktop-system-requirements> for more information or to test your computer for compatibility with ArcGIS.

Note: ArcGIS WILL NOT RUN ON THE APPLE OS. You will need to run a windows OS or have full access to a windows based computer.

Internet access: A reliable high-speed internet connection is required for all students enrolled in the course.

Required Textbook: No required text. Periodic readings from online sources will be assigned.

Supplementary Textbook (not required):

Mastering ArcGIS 5th edition, Price. ISBN: 9780077462956
This book is a thorough 'recipe' style GIS workbook. Includes data disk.

GIS Fundamentals 4th edition, Bolstad. ISBN: 9780971764736
This is a very approachable text on the principles underlying GIS.

Activities

Each module will be composed of a reading assignment, power point presentation, video tutorials, short quiz, and a set of lab instructions. Modules and course materials (except the reading material) will be available on Canvas.

Lab exercises are designed to provide students the opportunity to learn GIS and GISc concepts through hands-on experience. Lab exercises have been written with the intent of exposing students to fundamental tools of ArcGIS, promoting spatial thinking and

problem solving, and introducing a variety of resources to use for troubleshooting and/or designing analysis workflows. The pace of the class is such that students need to complete one module (or module component) per week of the semester.

Reading assignments from the textbook will accompany each module to help reinforce fundamental theoretical concepts behind geographic information systems and science.

Quizzes will accompany each of the modules. The quizzes are designed to reinforce the theoretical concepts of GIS (from the readings and power point slides) in order to support the learning objectives of the modules. Quizzes will be open book and untimed.

Work load: I'm not going to lie; this course will be *a lot* of work. You should expect to spend at least 10 hours per week (or maybe substantially more) on the activities for each module.

Course assessment: Assessment of the class will occur during week 15 utilizing the IDEA course assessment tool and a more specific Survey Monkey survey.

Grading

Grades for the class will be assigned based on the following weighting scale:

- Weekly assignments – 90% of total grade
- Quizzes – 10% of total grade

Utah State University Grading Scale:

A (93-100%)	B+ (87-89%)	C+ (77-79%)	D (60-69%)
A- (90-92%)	B (83-86%)	C (73-76%)	F (Below 60%)
	B- (80-82%)	C- (70-72%)	

Communication

Canvas will be utilized for basic communication of announcements, addressing frequently asked questions (FAQ), and general discussions. Messaging and the discussion forum in Canvas will be used. Additionally, the instructor will be available via email to answer any questions or to clarify issues that arise throughout the semester. The instructor will make efforts to respond to students as quickly as possible. Students are expected to monitor Canvas messaging in order to receive communications about the class in a timely manner.

The discussion board will be used as a forum for students to both post, and answer, questions about the modules. Student participation and helpfulness in answering other students' questions in the discussion forum will be evaluated as part of the grading structure.

In addition to the Canvas discussion board, the instructor will use screen capture demonstration videos and other technologies to ensure that adequate interaction and assistance is available.

Policies

Honor Pledge: Students will be held accountable to the Honor Pledge, which they have agreed to: “I pledge, on my honor, to conduct myself with the foremost level of academic integrity.”

Academic Dishonesty: The Instructor of this course will take appropriate actions in response to Academic Dishonesty, as defined the University’s Student Code:

Acts of academic dishonesty include but are not limited to:

1. Cheating: (1) using or attempting to use or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity, including working in a group when the instructor has designated that the quiz, test, examination, or any other academic exercise or activity be done “individually”; (2) depending on the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; (3) substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work; (4) acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission; (5) continuing to write after time has been called on a quiz, test, examination, or any other academic exercise or activity; (6) submitting substantially the same work for credit in more than one class, except with prior approval of the instructor; or (7) engaging in any form of research fraud.

2. Falsification: altering or fabricating any information or citation in an academic exercise or activity.

3. *Plagiarism: representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes using materials prepared by another person or by an agency engaged in the sale of term papers or other academic materials.*

This instructor highly values the University’s Academic Code of Conduct and the integrity of this course. Plagiarism will not be tolerated in this course. I recommend that you clearly cite all sources referenced in any part of the work you submit for this course. Give full credit to the original source (person or entity) for any ideas, thoughts, phrases (reworded or not), or data that you use, in part or in whole.

Full text of the Student Code available at available at available at <http://www.usu.edu/studentservices/pdf/StudentCode.pdf>:

Special needs: Students with ADA-documented physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations. Veterans may also be eligible for services. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, (435)797-2444 voice, (435)797-0740 TTY, (435)797-2444 VP, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.

Week	Month	Dates	Module Topic	Lab Topic	Reading
1	Jan	7-13	Mod 0: Getting Started	Installing ArcGIS, Discussion board, Canvas	(TBD)
2		14 – 20	Mod 1: Intro to ArcGIS	Introduction to ArcGIS and Spatial Data	
3		21-27	Mod 2: Data Display	Displaying Data	
4	J/F	28- 3	Mod 3: Spatial Data	Understanding Spatial Data properties and structure	
5	Feb	4-10	Mod 4: Coordinate Systems	Coordinate Systems and non-spatial data	
6		11-17	Mod 5: Data Creation	Georeferencing	
7		18-24		Digitizing	
8	F/M	25- 3	Mod 6: Geoprocessing	Habitat Delineation	
9	Mar	4-10	Spring Break		
10		11-17	Mod 7: DEMs	Downloading, creating, understanding DEMs	
11		18-24		Creating Surfaces, Interpolation	
12		25-31	Mod 8: Geoprocessing	Emergency Response Case Study (vector based)	
13	Apr	1-7	Mod 9: Surface Analyses	Watershed Delineation and Stream Order	
14		8-14		Terrain Analyses: Slope, aspect, Zonal Statistics	
15		15-24	Mod 10: Comprehensive Analyses	Building Site Case Study (raster and vector based)	