



## Geographic Information Systems (INTD 225)

Sarah Boyle  
E-mail:boyles@rhodes.edu  
Office Phone: 843-3268

Office Hours: Mon. 9-11 AM  
Wed. 9-11 AM  
Office: Frazier Jelke 119-E

---

### Objectives

The purpose of this course is to provide students with an introduction to Geographic Information Systems (GIS) software, analyses, and applications. Throughout the semester students will use GIS to enhance their skills in mathematical reasoning and expression. By the end of the semester students should be able to:

- Use ArcGIS software;
- Use deductive reasoning and logic to draw conclusions based on numerical and spatial data;
- Analyze data using spatial statistics;
- Construct, run, and apply spatial models;
- Explore and critique the various ways of representing spatial data; and
- Apply GIS to their areas of interest (e.g., environmental issues, business, urban studies) and to real-world situations.

Students who successfully complete the objectives of the course receive credit for fulfilling the Foundation requirements for *F6: Gain facility with mathematical reasoning and expression*.

### Required and Suggested Reading & Viewing

Required documents that all students must read are posted on Moodle.

Students must also watch Episodes 1-4 of the [Geospatial Revolution Project](#).

There are many resources on Moodle to help you. If you would like to use a book as a reference, I suggest the following book:

Ormsby, T, E. Napoleon, R. Burke, C. Groessl, and L. Bowden. 2009. *Getting to Know ArcGIS Desktop (Second Edition)*. ESRI Press. ISBN: 978-1-58948-210-4. (This book comes with 180-day trial of ArcGIS 9.3 software.) Please note that there is a new version of ArcGIS (ArcGIS 10), which differs slightly from the version we are using (ArcGIS 9.3). With a background in ArcGIS 9.3 you will be fully capable of switching to newer versions of the software, as the new version is more automated (user-friendly).

### Required Materials

Students are required to purchase a portable USB Flash Drive (16 GB or larger) for use in the GIS course. GIS data files are often large, and it is unlikely that students will be able to save all of the necessary files in their student folder.

### Plagiarism

It is required that all students familiarize themselves with the information regarding plagiarism that is posted on Moodle. The act of plagiarism is a violation of the Honor Code, and all cases of plagiarism will be dealt with in a serious manner. Under no circumstances are students to turn in assignments that represent the work of another person.

### GIS Lab

The GIS Lab is located in Frazier Jelke 132 E. Hours of operation are posted on Moodle, on the door of the lab, and on the GIS web site: <http://www.rhodes.edu/academics/17004.asp>. The GIS Lab in Frazier Jelke has twelve computers with ArcGIS software; however, this lab is also used for Geology courses as well so students should not enter the GIS Lab when another course is being held.

## Overview of Graded Activities

This course combines lectures with hands-on activities. The purposes of the lectures are to provide students with an overview to the topic of the day, and to provide real-world examples of how GIS is used. Hands-on activities will consist of laboratory exercises, quizzes, and the final project.

### **Laboratory Exercises**

There will be 12 laboratory exercises throughout the semester. All exercises must be turned in via Moodle by 9:30 AM on the due date. **Late assignments will be penalized 20% for each day late, starting at 9:31 AM. Every 24 hours, another 10% will be lost.**

### **Quizzes**

There will be 11 in-class quizzes throughout the semester. These quizzes will test the students' comprehension of the topics that have been covered in class, as well as the students' problem-solving skills. These quizzes will be open-book, open-assignment, open-internet quizzes, but students are not allowed to give or receive help unless otherwise stated. The lowest quiz grade at the end of the semester will be dropped. Quizzes will be held at the start of class. Students who arrive late to class, or who are absent from class, will receive a zero on the quiz. **There will be NO make-up quizzes.**

### **Final Project**

Students will address a research question of their choice using GIS. Students will work individually or in pairs on the final project. Additional guidelines for the final project are posted on Moodle. All students will present the project in class on April 26. Students are encouraged to present their GIS project as an oral or poster presentation at URCAS on Friday, April 27.

### **Final Exam**

There will be a final exam on Wednesday, May 2 at 1 PM. The exam will assess the student's understanding and application of GIS. A study guide will be provide on Moodle one week prior to the exam.

## Grades

Students will receive a final grade for the semester based on a combination of laboratory exercises, quizzes, the final project, the final exam, and attendance in class.

Points will be distributed as follows:

	<u>Points</u>	<u>% of Grade</u>
Laboratory Exercises (12 in total)	240 (20 pts each)	48
Quizzes (11 in total; Drop the lowest quiz score)	100 (10 pts each)	20
Final Project (Proposal, Data, Final product)	80	16
Final Exam	80	16
	<hr/> 500	<hr/> 100

Final grades will be determined using the following scale:

100-93%	A	73-76%	C
90-92%	A-	70-72%	C-
87-89%	B+	67-69%	D+
83-86%	B	63-66%	D
80-82%	B-	60-62%	D-
77-79%	C+	<60%	F

## GIS Assistance

In addition to contacting Dr. Boyle, students may receive assistance with GIS questions during the posted GIS Lab office hours from the GIS RSAs Adam AISamadisi and Becky Vandewalle. Office hours are posted on Moodle, on the door of the GIS Lab (located in Frazier Jelke 132 E), and on the GIS web page. **Under NO circumstances are students to contact the RSAs outside of his/her office hours. The RSAs have classes and other obligations. Please be respectful of their time.**

## Schedule for Spring 2012

Day	Date	Subject	Assignment Due / Quiz	Required Reading and Watching**
Th	1/12	What is GIS?		<p><a href="#">Three Views of GIS</a>; <a href="#">How Maps Convey Geographic Information</a>; <a href="#">Georeferencing and Coordinate Systems</a>; <a href="#">Elements of Geographic Information</a>; <a href="#">ArcMap Tools Toolbar</a>; <a href="#">ArcMap Standard Toolbar</a>; <a href="#">Overview of Tables and Attributes</a></p> <p>Watch <b>Episode 1</b> of the <a href="#">Geospatial Revolution Project</a> online.</p>
T	1/17	Symbology and Cartography	Exercise #1: Intro to GIS	<p>Butler 2010; <a href="#">Data Frames</a>; <a href="#">Map Layers</a>; <a href="#">Symbols and Styles</a>; <a href="#">Text on Maps</a>; <a href="#">Ways to Map Quantitative Data</a>; <a href="#">Equal Interval</a>; <a href="#">Defined Interval</a>; <a href="#">Quantile</a>; <a href="#">Natural Breaks (Jenks)</a>; <a href="#">Geometrical Interval</a>; <a href="#">Standard Deviation</a>; <a href="#">About Symbolizing Data to Represent Quantity</a>; <a href="#">Basics of Making Maps</a></p> <p>Watch <b>Episode 2</b> of the <a href="#">Geospatial Revolution Project</a> online.</p>
Th	1/19	<b>Quiz 1</b>	<b>Quiz 1</b>	
T	1/24	Mathematical Reasoning & Expression; Queries	Exercise #2: Symbology	<p><a href="#">Statistical Analysis</a>; <a href="#">Using Select by Attributes</a>; <a href="#">About Building an SQL Expression</a>; <a href="#">Using Select by Location</a></p> <p>Watch <b>Episode 3</b> of the <a href="#">Geospatial Revolution Project</a> online.</p>
Th	1/26	<b>Quiz 2</b>	<b>Quiz 2</b>	
T	1/31	Buffers & Locating Data	Exercise #3: Queries	<p>Monmonier 2005; <a href="#">Proximity Analysis</a>; <a href="#">What Is Raster Data</a>; <a href="#">Representing Features in a Raster Dataset</a>; <a href="#">What Is Geoprocessing?</a></p> <p>Watch <b>Episode 4</b> of the <a href="#">Geospatial Revolution Project</a> online.</p>
Th	2/2	<b>Quiz 3</b>	<b>Quiz 3</b>	
T	2/7	Editing Data	Exercise #4: Buffers	<a href="#">Overview of Editing</a> ; <a href="#">Overview of ArcCatalog</a>
Th	2/9	<b>Quiz 4</b>	<b>Quiz 4</b>	
T	2/14	Projections	Exercise #5: Editing Data	<p><a href="#">An Overview of Map Projections</a>; <a href="#">Projection Basics</a>; <a href="#">About Geographic Coordinate Systems</a>; <a href="#">Spheroids and Spheres</a>; <a href="#">Datums</a>; <a href="#">About Map Projections</a>; <a href="#">Geographic Transformation Methods</a></p>
Th	2/16	<b>Quiz 5</b>	<b>Quiz 5</b>	
T	2/21	Joins and Relates & Geocoding	Exercise #6: Projections	<a href="#">Table Analysis</a> ; <a href="#">Overview of Geocoding</a> ; <a href="#">Definition of an Address Locator</a> ; <a href="#">Process of Geocoding</a>
Th	2/23	<b>Quiz 6</b>	<b>Submit Research Project Proposal; Quiz 6</b>	

Day	Date	Subject	Assignment Due / Quiz	Required Reading**
T	2/28	Rectification & Google Earth	Exercise #7: Joins & Relates and Geocoding	Pringle 2010; Butler 2006; <a href="#">Georeferencing a Raster Dataset</a>
Th	3/1	<b>Quiz 7</b>	<b>Quiz 7</b>	
T	3/6	Density & Spatial Autocorrelation	Exercise #8: Rectification	<a href="#">Discrete and Continuous Data</a> ; <a href="#">Understanding Density Analysis</a> ; <a href="#">Density Calculations</a> ; <a href="#">Spatial Autocorrelation</a>
Th	3/8	<b>Quiz 8</b>	<b>Quiz 8</b>	
<b>SPRING BREAK – NO CLASS</b>				
T	3/20	Surface Analysis: Slope, Aspect, & Hillshade	Exercise #9: Density	<a href="#">Surface Creation and Analysis</a> ; <a href="#">Calculating Slope</a> ; <a href="#">Determining Aspect</a> ; <a href="#">Producing a Hillshade</a>
<b>W</b>	<b>3/21</b>	<b>URCAS Abstracts are due today. It is not required that you present at URCAS, but students are encouraged to do so.</b>		
Th	3/22	<b>Quiz 9</b>	<b>Quiz 9</b>	
T	3/27	Map Algebra, Models, & Reclassification	Exercise #10: Surface Analysis	<a href="#">What is Map Algebra</a> ; <a href="#">Map Algebra Results</a> ; <a href="#">Understanding Reclassification</a> ; <a href="#">Reclass Analysis Sample Application</a>
Th	3/29	<b>Quiz 10</b>	<b>Submit Data for Research Project; Quiz 10</b>	
T	4/3	Interpolation (IDW, Kriging & Natural Neighbor)	Exercise #11: Map Algebra, Models & Reclassification	<a href="#">Understanding Interpolation Analysis</a> ; <a href="#">Implementing IDW</a> ; <a href="#">Applying a Spline Interpolation</a> ; <a href="#">Using Kriging</a> ; <a href="#">Interpolation Analysis Sample Applications</a>
<b>EASTER RECESS – NO CLASS</b>				
T	4/10	GIS as a career		
Th	4/12	<b>Quiz 11</b>	<b>Quiz 11</b>	
T	4/17	Research Project	Exercise #12: Interpolation	
Th	4/19	Research Project		
T	4/24	Research Project		
Th	<b>4/26</b>	<b>Class Presentations: Final Project</b>	<b>Presentation</b>	
F	<b>4/27</b>	<b>URCAS</b>	<b>Presentation; Final Project Due</b>	
W	<b>5/2</b>	<b>Final Exam: 1 PM</b>	<b>Final Exam: 1 PM</b>	

**\*\*Note that assigned reading (and videos) are posted directly on Moodle. All students are responsible for checking Moodle regularly for updates. This schedule is subject to change, based on the discretion of Professor Boyle**