

# Principles of Geographic Information Systems (GIS)

GEO426/526: Fall 2011, Section 101 - CRN 2499 or CRN 2507

Instructors: James Leonard, Ph.D. Jonathan Phoenix, Teaching Assistant (TA)	Time: Mon. 6:30-9:00pm and extra lab time as needed
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Office hours: Dr. Leonard (Harris Hall 208): Mon., Wed., Fri. 9:30-11:00am; Mon. 5:30-6:30; or by appointment Jonathan Phoenix (Harris Hall 215): Tues. 3:30-6:00pm; Thurs. 10:30-11:45am; or by appointment	<a href="mailto:leonard@marshall.edu">leonard@marshall.edu</a>

## Description from University Catalog:

Introduction to Geographic Information Systems (GIS) principles, techniques, and applications for the social and natural sciences with emphasis on foundational geographic principles in a lecture/lab format. 4 credit hours.

## Course objectives:

As you complete the course material, you will be asked to:

- Recognize and apply geographic concepts and principles that form the foundation of GIS such as ellipsoids, datums, map projections and coordinate systems, map/spatial analysis, and cartographic design
- Recognize and apply computing principles of GIS such as importing, storing, and manipulating tabular and spatial data, geodatabases and SQL queries, and metadata
- Practice and employ the basic techniques of ArcGIS software
- Explain GIS concepts to your peers
- Construct your own finished GIS project by integrating techniques and principles

## Required materials:

- Price, Meribeth. 2009. Mastering ArcGIS, 5th ed. NY: McGraw-Hill. Cost = \$90 or so. Do not use earlier editions.
- Two-inch three-ring binder. You will use this binder to organize all your semester project materials. Cost = \$1 or so.
- Readings posted on MUOnline. Free to download and use in GEO426/526.

## **Time Inside and Outside of Class:**

Class time will consist of one or more of the following: 1) presentation and discussion of GIS principles; 2) learning GIS principles using map analysis and ArcGIS exercises; 3) lab time for exercises. Make good use of this class time. You must attend every class! This class, though, consists of more than simple class attendance. Expect to spend about nine to twelve hours each week (including class time) on course material. You may require extra practice with the ArcGIS software on your own time. Do NOT wait until the day an assignment is due to begin it.

## **Software access:**

Every Computing Facilities Lab will have ArcGIS available. When no class is using the lab, you may access the Geography GIS Lab in Harris Hall 202 by swiping your ID card. The exercise data is available on a network drive (\\mufilerseve02\geography\). You can also access ArcGIS from home. I will hand out instructions to explain how.

## **Teaching Assistant:**

Your TA has office hours every week. You should consult him for problems with the textbook chapter readings, tutorials, exercises, and review questions; software questions; and ESRI Virtual Campus Modules. For exams, semester project, and questions about your grades, please see Prof. Leonard.

## **Grading:**

Grades will be based on:

- ten homework assignments (20 points each) for 200 points; all homework assignments will be collected and count for a grade ten random occasions;
- five online ESRI Virtual Campus Modules (20 points each) for 100 points;
- five MUOnline quizzes (30 points each) for 150 points;
- two one-hour classroom exams (50 points each) for 100 points; and
- a semester project for 50 points.

Graduate students will have more extensive and difficult material. Final grades will be determined by the total number of points you have earned:

- A = 600 - 546 points (100-91%)
- B = 454 - 486 (90-81%)
- C = 485 - 426 (80-71%)
- D = 425 - 390 (70-65%)
- F = 389 and below (less than 65%)

There will be no extra credit and no grades will be scaled or curved. Please be aware that:

- This is a senior-/graduate-level course. You will be expected to perform at a high level. The pace of the course is rapid.
- Incomplete assignments will be returned for no credit.
- You must be thorough and careful on all exercises to receive full credit.
- You must master all exercises, textbook and article readings, online course material, lecture material, and ArcGIS skills and concepts to do well.
- All course material assigned as homework must be turned in at the beginning of class on Monday. You may not submit material after class begins.
- The ESRI Virtual Campus course modules can only be completed by working through the material and passing ESRI mini-exams. You may take each mini-exam as often as you need.

### **Attendance Policy:**

You must attend every class. Course material assigned during class must be turned in before the beginning of class on the next Monday. You may not submit material after class begins. If you will not be present for an excused reason on a day an exercise is due, you must turn it in early. Failure to follow these instructions will result in a zero for that assignment. I do not accept unexcused absences. I follow University policy for excused absences. You must provide adequate documentation for any excused absence. Because missing class means missing class material, instruction, and concepts, I will deduct one letter from your final grade for each missed class after the second. You will be held to the highest standards in regard to academic attendance, participation, and punctuality.

### **Academic Honesty and Plagiarism:**

University policy states that any act of a dishonorable nature which gives the student engaged in it an unfair advantage over others engaged in the same or similar course of study is prohibited. You must do your own work inside and outside of this class. Cheating/plagiarism in or out of this class is prohibited. You will be given a final grade of F for any instance of academic dishonesty. I am happy to assist you with anything you do not understand or have questions about. Cheating in this course includes, but is not limited to recording identical answers and screen captures as a classmate for your assignments or plagiarizing material from the textbook or readings. If you quote from the textbook or readings, use quotation marks and cite the source, year, and page number. Jesus said: "Whoever can be trusted with very little can also be trusted with much, and whoever is dishonest with very little will also be dishonest

with much." I do not tolerate any plagiarism or cheating!

## University policies:

University policies concerning equal opportunity/affirmative action, students with disabilities, inclement weather, withdrawal and refunds, academic honesty, acceptable computer usage, grade appeals, sexual harrassment, and much more are available online at <http://www.marshall.edu>.

## Weekly Schedule (subject to change):

Assignments are due at the BEGINNING of class on Monday after they are assigned, unless otherwise stated. Quizzes are taken using MUOnline and are due Fridays before 11:59pm.

- Aug. 27: What is GIS? Chapter 1 - GIS Data; Jobs in GIS; remote access to ArcGIS
  - Classroom: Software and data access; textbook Chapter 1 tutorial
  - Assignment #1: Textbook Chapter 1 exercises and review questions; print five entry-level jobs in your field that have GIS skills as a primary qualification (links to job/career sites are available at <http://www.marshall.edu/geography/jobs.asp>).
- Sept. 3: Holiday!
- Sept. 10: Chapter 2 - Mapping GIS Data; Chapter 3 Presenting GIS Data
  - Classroom: Data types and map types; Big picture map design
  - Assignment #2: Textbook Chapter 2 exercises and review questions
  - Assignment #3: Chapter 3 exercises and review questions
- Quiz #1 deadline Fri., Sept. 14
- Sept. 17: Semester Project instructions and examples; Cartographic design
  - Classroom: Map page elements; Cartographic design rules; SmartCart
  - Meet with me about Semester Project
  - Cartographic design reading: Slocum et al. chapter 11
  - Assignment #4: Cartographic design exercises handouts
- Sept. 24: Chapter 4 - Attribute Data
  - Classroom: Manipulating tables
  - Assignment #5: Chapter 4 exercises and review questions
  - Project Part 1 (Initial Research) due next week
- Oct. 1: GPS overview (Trimble website)
  - Project Part 1 (Initial Research) due
  - Classroom: GPS fieldwork
  - Assignment #6: GPS handouts
- Quiz #2 deadline Fri., Oct. 5
- Oct. 8: Semester Project work
  - Meet with me about Semester Project
  - Project Part 2 (Data Collection) due after exam
  - Project Part 3 (Map Comparison) due after exam

- Oct. 15: **Exam #1 one hour**; Importing Data
  - Assignment #7: Gorr and Kurland Chapter 5 A-1 and A-2
- Oct. 22: Chapter 11 - Coordinate Systems
  - Project Part 2 (Data Collection) due
  - Project Part 3 (Map Comparison) due
  - Classroom: Globe properties; ellipsoids and datums; globe exercises; ESRI Virtual Campus
  - ESRI Virtual Campus course *Map projections and coordinate systems*: Module 1
  - Geodesy reading: Robinson et al. chapter 2
  - Assignment #8: Chapter 11 exercises and review questions
- Oct. 29: Map projections
  - Classroom: Map projections
  - ESRI Virtual Campus course *Map projections and coordinate systems*: Modules 2&4
  - Assignment #9: Map projections and datums exercise
  - Projections reading: Dent et al. part of chapter 3
- Quiz #3 deadline Fri., Nov. 2
- Nov. 5: Coordinate systems and scale
  - Classroom: Coordinate systems and scale
  - ESRI Virtual Campus course *Map projections and coordinate systems*: Modules 5&6
  - Reading: Slocum et al. part of chapter 4
  - Project Part 4 (Map Projections) due next class
  - Project Part 5 (Cartographic Design) due next class
- Nov. 12: Project printing
  - Classroom: Project finalization and printing
  - Project Part 4 (Map Projections) due
  - Project Part 5 (Cartographic Design) due
- Nov. 19: Thanksgiving week!
- Nov. 26: Chapter 5 - Queries
  - Classroom: Spatial and attribute queries
  - Assignment #10: Chapter 5 exercises and review questions
- Dec. 3: Chapter 7 - Geoprocessing;
  - Classroom: Geoprocessing
  - Assignment #11: Chapter 7 exercises and review questions
- Dec. 10: Chapter 12 - Digitizing
  - Classroom: Digitizing
  - Assignment #12: Chapter 12 exercises and review questions
- Quiz #4 deadline Fri., Dec. 14
- Dec. 17: **Exam #2 one hour**