Principles of Geographic Information Systems (GIS)

GEO426: Fall 2009, Section 101 - CRN 2448 or CRN 2458

Instructor: James Leonard, Ph.D.	Time: M 6:30-9:00pm
Phone: (304) 696-4626	Classroom: HH202
Office hours (Harris Hall 208): MWF 9:30-11:00am; T 2:30-4:00pm; or by appointment	leonard@marshall.edu

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:

- Recognize and apply the 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 the 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
- Construct your own finished GIS project by integrating techniques and principles

Required materials:

- Price, Meribeth. 2009. Mastering ArcGIS, 4th ed. NY: McGraw-Hill. Cost = $90 or so.
- Readings posted online. 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 six to nine 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 (\\marshall.edu\munet\geography\). You can also access ArcGIS from home. I will hand out instructions to explain how.

Grading:

Grades will be based on **fourteen [previously ten]** exercises assigned during class (20 points each) for

280 points; five online ESRI Virtual Campus Modules (20 points each) for 100 points; eight quizzes (20 points each) for 160 points; and a **final project for 160 points [previously 100 points]**. **Graduate students will have more extensive exercises (each week will have an additional challenge) and a more extensive final project.** Final grades will be determined by the total number of points you have earned:

- A = 600 - 540 points (100-90%)
- B = 529 - 480 (89-80%)
- C = 479 - 420 (79-70%)
- D = 419 - 360 (69-60%)
- F = 359 and below (less than 60%)

There will be no extra credit and no grades will be scaled or curved. No matter how many points you accumulate, you cannot get an A in this class without completing all course material and all instructor-recommended revisions. 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.
- You must be thorough and complete 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 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 like.

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 you 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.
- Plagiarizing material from the textbook or readings. To avoid plagiarism, read all assigned chapters and material first; complete your exercises second; then base your written answers to review questions on your experience; only refer to the textbook or readings as necessary. I'd prefer

you base your answers on experience with the software, but if you quote from the textbook or readings, use quotation marks and cite the source. 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. 23: What is GIS? Chapter 1 - GIS Data; Jobs in GIS; remote access to ArcGIS
  - Classroom: Textbook Chapter 1 tutorial
  - Assignment #1: Introduction paragraph summary; 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).
- Aug. 30: Semester Project instructions and examples; Chapter 2 - Mapping GIS Data; Chapter 3 Presenting GIS Data; **Data classification [new material]**
  - Classroom: Review; **Data classification lecture [new material]**; Textbook Chapter 2 tutorial
  - Assignment #2: Textbook Chapter 2 exercises and review questions
  - Assignment #3: Chapter 3 exercises and review questions
  - **Assignment #4: Data Classification [new material]**
- Quiz #1 deadline Sept. 4
- Sept. 6: Holiday! Work on homework this week.
- Sept. 13: **Globe properties lecture [new material]**; Cartographic design
  - Classroom: Cartographic design rules; SmartCart; Cartographic design exercise;
  - Meet with me about Semester Project
  - **Geodesy reading [new material]**
  - Cartographic design readings: Slocum et al. chapter 11, Slocum et al. part of chapter 4
  - **Assignment #5 - Globe exercises handout [new material]**
- Quiz #2 deadline Sept. 18
- Sept. 20: Chapter 4 - Attribute Data
  - Project Part 1 (Initial Research) due next week
  - Classroom: Review; Chapter 4 tutorial
  - Assignment #6 - Chapter 4 exercises and review questions
- Sept. 27: GPS overview (Trimble website)
  - Project Part 1 (Initial Research) due
  - Classroom: GPS fieldwork
  - Assignment #6: GPS handouts
- Quiz #3 deadline Oct. 2
- Oct. 4: Chapter 5 - Queries
  - Classroom: ESRI Virtual Campus course *Queries*
  - Assignment #7: Chapter 5 exercises and review questions

    - Project Part 2 (Data Collection) due next week
- Oct. 11: Chapter 6 - Spatial joins
    - Classroom: Spatial joins
    - Assignment #8: Chapter 6 exercises and review questions
    - Project Part 2 (Data Collection) due
- Quiz #4 deadline Oct. 16
- Oct. 18: Chapter 7 - Geoprocessing
    - Classroom: Geoprocessing
    - Assignment #9: Chapter 7 exercises and review questions
    - Project Part 3 (Initial Map Comparison) due next week
- Oct. 25: Chapter 10 - Geocoding
    - Classroom: Geocoding
    - Assignment #10: Chapter 10 exercises and review questions
    - Project Part 3 (Initial Map Comparison) due
- Quiz #5 deadline Oct. 30
- Nov. 1: Chapter 11 - Coordinate Systems
    - Classroom: Globe properties; ellipsoids and datums; globe exercises; ESRI Virtual Campus;
    - ESRI Virtual Campus course *Map projections and coordinate systems*: Module 1
    - Assignment #11: Chapter 11 exercises and review questions;
- Nov. 8: Map projection
    - Classroom: Map projections
    - ESRI Virtual Campus course *Map projections and coordinate systems*: Modules 2&4
    - Geodesy reading: Robinson et al. chapter 2
    - Projections reading: Dent et al. part of chapter 3
- Quiz #6 deadline Nov. 13
- Nov. 15: Coordinate systems and scale
    - Classroom: Coordinate systems and scale illustrated using a topographic map
    - ESRI Virtual Campus course *Map projections and coordinate systems*: Modules 5&6
    - Project Part 4 (Choose Map Projections) due next class
    - **Assignment #12 - Topographic map exercise [new material]**
- Nov. 22: Thanksgiving week!
- Quiz #7 deadline Nov. 27
- Nov. 29: Chapter 12: Basic Editing
    - Classroom: Basic Editing
    - Assignment #13: Chapter 12 exercises and review questions
    - Project Part 4 (Choose Map Projections) due
- Dec. 6: Chapter 14 - Geodatabases
    - Classroom: Geodatabases; Meet with me about Semester Project
    - Assignment #14: Chapter 14 exercises and review questions
    - Project Part 5 (Cartographic Design) due next week
- Quiz #8 deadline Dec. 11
- Dec. 13: Printing large maps for Semester Project
    - Project Part 5 (Cartographic Design) due