GIS Vector Analysis and Geostatistics
GEO429/529: Spring 2012, Section 201, CRN 3619 (GEO429) or CRN 3626 (GEO529)

Instructor: James Leonard, Ph.D.	Time: M 6:30-9:00pm
Phone: (304) 696-4626	Place: HH202
Office HH208: Mon., Wed., Fri. 9:30am-11:00am; Mon. 2:00-3:30pm; other times by appointment	leonard@marshall.edu

University catalog description:

Introduction to GIS vector analysis, beginning with the vector data model, and including buffering, overlay analysis, geocoding, and network analysis. Prerequisite: GEO426/526, IST423, GEO430/530 or any junior/senior level GIS course. Basic knowledge of statistics would be very useful. 3 credit hours

Course objectives:

As you complete the course material, you will:

- Calculate geostatistics manually and using GIS;
- Read, evaluate, and interpret geostatistical and vector GIS research;
- Practice vector input and analysis concepts;
- Employ geostatistics and vector analysis techniques to solve a variety of problems;
- Apply GIS vector input, analysis, documentation, and cartographic design techniques to complete a guided project.

Required materials:

- Price, Meribeth. 2009. Mastering ArcGIS, 5th ed. NY: McGraw-Hill. Cost = $80 or so. Do not use earlier editions. You might already have a copy from GEO426/526.
- Allen, D.W. 2011. *GIS Tutorial 2: Spatial Analysis Workbook* . Redlands, CA: ESRI Press. Cost = $50 or so. Do not use earlier editions.
- Readings posted to MUOnline. Free to download and use only in GEO4/529.

Time Inside and Outside of Class:

Class time will consist of one or more of the following: 1) presentations of geostatistics and vector analysis concepts; and 2) lab time for exercises. **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. The software is available campus-wide in University Computing Facilities Labs and remotely from your home. The exercise data is available on a network drive (\\mufileserve02\geography\) and is accessible campus-wide. I will give further instructions in class.

Grading:

Grades will be based on fourteen exercises assigned during class (20 points each) for 280 points; four reading summaries (30 points each) for 120 points; and a final project for 100 points. Grad students will have more extensive exercises and project. Final grades will be determined by the total number of points you have earned:

- A = 500 - 455 points (100-91%)
- B = 454 - 405 (90-81%)
- C = 404 - 355 (80-71%)
- D = 354 - 325 (70-65%)
- F = 324 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.
- 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.
- Exercises assigned as homework must be turned at the beginning of the next class period. No late work is accepted.
- Project elements are due at the beginning of class on the day listed on the schedule. No late work is accepted for credit, however, each project element must be completed before subsequent parts will be graded.

Attendance Policy:

You must attend every class. If you will not be present for an excused reason you MUST turn all work in early. Failure to follow these instructions will result in loss of points. 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 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 earn a zero and one letter grade reduction for cheating/plagiarism on the exercises or summaries, OR a final grade of F cheating/plagiarism on the project. University sanctions for academic dishonesty include a permanent record of your dishonesty, suspension from the institution for one year for the second offense, and dismissal from the institution for the third offense. 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:

- Turning in the same work as a classmate for your assignments;
- Plagiarizing material from the textbook or readings for written summaries/project;
- 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 cheating or plagiarism!

Weekly Schedule (subject to change):

Assignments are due at the BEGINNING of the next class period after they are assigned, unless otherwise stated in class.

Geostatistics and GIS Vector Analysis

- Jan. 9: What are Geostatistics and Vector Analysis? Research using Geostatistics and Vector Analysis; Map patterns and density; buffers, overlay, distance analysis
  - Summary #1
  - 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).
  - Assignment #1 - Allen chapter 4 parts 4-1 and 4-2; Allen chapter 5 parts 5-1 through 5-5; Allen chapter 6 parts 6-1 through 6-3. Allen tells you what to turn in for each workbook exercise; when you have the option, you must print maps and documents for submission.
- Jan. 16: Holiday!
- Jan. 23: Spatial Joins
  - Reading: Price ch. 6
  - Assignment #2 - Price ch. 6 exercises and review questions
- Jan. 30: Data classification and visualization
  - Assignment #3 - Data classification and visualization handout; Allen chapter 2 parts 2-1 and 2-2; Allen chapter 3 parts 3-1 and 3-2.
- Feb. 6: Geostatistics 1: Calculating mean, standard deviation, z scores, mean center, standard distance
  - Assignment #4 - Geostatistics handouts
- Feb. 13: Vector analysis: Using GIS for spatial center, standard distance, directional distribution; ESRI Virtual Campus *Understanding Spatial Statistics*
  - Summary #2

- ○ Assignment #5 - Allen chapter 7 parts 7-1 through 7-5.
- Feb. 20: Geostatistics 2: Calculating nearest neighbor, quadrat analysis, cluster analysis
  - ○ Assignment #6 - Geostatistics handouts
- Feb. 27: Vector analysis: Using GIS for pattern analysis--nearest neighbor, cluster analysis, LISA
  - ○ Summary #3
  - ○ Assignment #7 - Allen chapters 8-9 all parts
- Mar. 5: Vector analysis: GeoDa
  - ○ Summary #4
  - ○ Assignment #8 - GeoDa
- Mar. 12: Location-allocation analysis
  - ○ Project Part 1 due next class
  - ○ Reading: http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#//00470000050000000.htm
  - ○ Assignment #11 - Allen chapter 5 parts 5-8 and 5-9; Location-allocation analysis exercise tutorial
- Mar. 19: Spring Break
- Mar. 26: Geostatistics 3: Calculating correlation and regression
  - ○ Project Part 1 due
  - ○ Assignment #9 - Geostatistics handouts
- Apr. 2: Vector analysis: ESRI Virtual Campus course *Regression Analysis Basics*
  - ○ Assignment #10 - Regression Analysis

Project completion; GIS data input and storage

- Apr. 9: Geocoding
  - ○ Project Parts 2&3 due next class
  - ○ Readings: Price ch. 10
  - ○ Assignment #12: Price ch. 10 exercises and review questions
- Apr. 16: GPS; Digitizing
  - ○ Project Parts 2&3 due
  - ○ Readings: Price ch. 13
  - ○ Assignment #13: GPS field work; Georeferencing an image for digitizing; Price ch. 13 exercises and review questions
- Apr. 23: Storing data - Geodatabases; Documenting data - Metadata
  - ○ Project Part 4 due next class
  - ○ Readings: Price ch. 14 & 15
  - ○ Assignment #14: Price ch. 14 & 15 exercises and review questions
- Apr. 30: Project final submission

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.