Principles of Geographic Information Systems (GIS)

GEO426/526: Fall 2011, Section 101 - CRN 2535 or CRN 2542

Instructors: James Leonard, Ph.D. Teaching Assistant (TA) Britt Arcadipane	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. :00-3:30pm; or by appointment Teaching Assistant (Harris Hall 215): Tues. 7:00-9:00pm; Fri. 2:00-4:00pm	Prof. Leonard:leonard@marshall.edu TA:arcadipane@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:

Course Learning Outcomes	How students will practice each outcome	How student achievement will be assessed
Students will 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.	Assigned readings, class discussion, Virtual Campus course, and homework exercises	Homework exercises, quizzes, exams, semester project
Students will recognize and apply computing principles of GIS such as importing, storing, and manipulating tabular and spatial data, geodatabases and SQL queries, and metadata.	Assigned readings, class discussion, Virtual Campus course, and homework exercises	Homework exercises, quizzes, exams, semester project
Students will practice and employ the basic techniques of ArcGIS software.	Virtual Campus course, and homework exercises	Homework exercises, quizzes, exams, semester project
Students will construct a finished GIS project by integrating techniques and principles.	Assigned readings, class discussion, Virtual Campus course, homework exercises, and exams	Semester project

Required materials:

- Price, Maribeth. 2013. Mastering ArcGIS, 6th ed. NY: McGraw-Hill. ISBN:0077826264 / 9780077826260. Cost = $125 or so. Do not use earlier editions.
- Course readings posted online, free for use in the course, including:
  - Slocum, T., McMaster, R., Kessler, F., Howard, H. 2009. Chapter 11: Map Elements and Typography from *Thematic Cartography and Geovisualization*, 3rd ed. Prentice Hall.
  - Robinson, A., Morrison, J., Muehrcke, P., Kimerling, A., Guptill, S. 1995. Chapter 4: Basic Geodesy from *Elements of Cartography*, 6th ed. John Wiley and Sons.
  - Dent, B., Torguson, J., Hodler, T. 2009. Chapter 3: Map Projections from *Cartography: Thematic Map Design*, 6th ed. McGraw Hill.
- Two-inch three-ring binder. You will use this binder to organize all your semester project materials. Cost = $3 or so.
- Great free resource: An Open Geospatial Textbook https://www.e-education.psu.edu/natureofgeoinfo/

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 (\\mufileserve02\geography\). You can also access ArcGIS using an evaluation copy of the software, which I can provide you.

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 (25 points each) for 250 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 (67 points each) for 134 points; and
- a semester project for 66 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 = 700 - 637 points (100-91%)
- B = 636 - 567 (90-81%)
- C = 566 - 497 (80-71%)
- D = 496 - 455 (70-65%)
- F = 454 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 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. The instructor and TA are happy to assist you with anything you do not understand or have questions about. Cheating in this course includes, but is not limit 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:

By enrolling in this course, you agree to these University Policies: Academic Dishonesty, Excused Absence Policy for Undergraduates, Computing Services Acceptable Use, Inclement Weather, Dead Week, Students with Disabilities, Academic Forgiveness, Academic Probation and Suspension, Academic Rights and Responsibilities of Students, Affirmative Action, and Sexual Harassment. Please read the full text of each policy by going to www.marshall.edu/academic-affairs and clicking on “Marshall University Policies.”

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. 26: What is GIS? Chapter 1 - GIS Data; Jobs in GIS; ArcGIS evaluation disks
  - 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).
  - Great free resource to examine: Chapter 1 of The Nature of Geographic Information https://www.e-education.psu.edu/natureofgeoinfo
- Sept. 2: Holiday!
- Sept. 9: Semester Project instructions and examples; Chapter 2 - Mapping GIS Data
  - Classroom: Lectures on: Data storage; Map types
  - Assignment #2: Textbook Chapter 2 exercises and review questions
  - Meet with me about Semester Project
- Sept. 16: Chapter 3 Presenting GIS Data; Cartographic design
  - Classroom: Lectures on: Big picture map design; Map page elements; Cartographic design rules; SmartCart
  - Assignment #3: Chapter 3 exercises and review questions
  - Assignment #4: Cartographic design exercises handouts
  - Cartographic design reading: Slocum et al. chapter 11
- Quiz #1 deadline Fri., Sept. 20
- Sept. 23: Cartographic design review using student papers; Chapter 4 - Attribute Data
  - Classroom: Tables lecture
  - Project Part 1 (Initial Research) due next week

    - Assignment #5: Chapter 4 exercises and review questions
- Sept. 30: Importing data for projects
    - Classroom: Downloading and importing census data demonstration
    - Project Part 1 (Initial Research) due
    - Assignment #6: Gorr and Kurland Chapter 5 assignment A-1
    - Great free resource to examine: Chapter 3 of The Nature of Geographic Information https://www.e-education.psu.edu/natureofgeoinfo
- Quiz #2 deadline Fri., Oct. 4
- Oct. 7: GPS - georeferencing an image
    - Classroom: GPS fieldwork
    - Assignment #7: GPS handouts
    - Great free resource to examine: Chapter 5 of The Nature of Geographic Information https://www.e-education.psu.edu/natureofgeoinfo
- Oct. 14: **Exam #1 one hour**;
    - Meet with me about Semester Project
    - Project Part 2 (Data Collection) due next class
- Oct. 21: Chapter 5 - Queries
    - Project Part 2 (Data Collection) due
    - Classroom: Spatial and attribute queries lecture
    - Assignment #8: Chapter 5 exercises and review questions
- Oct. 28: Chapter 12 - Digitizing
    - Project Part 3 (Map Creation and Analysis) due next class
    - Classroom: Digitizing
    - Assignment #9: Chapter 12 exercises and review questions
- Quiz #3 deadline Fri., Nov. 1
- Nov. 4: Globe properties; ellipsoids and datums
    - Project Part 3 (Map Creation and Analysis) due
    - Project Part 4 (Large Poster Design) due next class
    - Classroom: Globe properties; ellipsoids and datums lecture
    - Geodesy reading: Robinson et al. chapter 2
    - Assignment #10: Globe properties handout
    - Great free resource to examine: Chapter 2 of The Nature of Geographic Information https://www.e-education.psu.edu/natureofgeoinfo
- Nov. 11: ESRI Virtual Campus; Project poster printing
    - Project Part 4 (Large Poster Design) due
    - Classroom: Project finalization and printing
    - ESRI Virtual Campus course *Map projections and coordinate systems*: Module 1
    - Assignment#11: Chapter 11 exercises and review questions
- Quiz #4 deadline Fri., Nov. 15
- Nov. 18: Map projections
    - Classroom: Map projections lecture
    - ESRI Virtual Campus course *Map projections and coordinate systems*: Modules 2&4
    - Assignment #12: Map projections and datums exercise
    - Projections reading: Dent et al. part of chapter 3
- Nov. 20: GIS Day!
- Nov. 25: Thanksgiving week!
- Dec. 2: 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
- Quiz #5 deadline Fri., Dec. 6
- Dec. 9: **Exam #2 one hour**