Geography 241: Fundamentals of Geographic Information Systems

Winter 2019 (Section 1)

Instructor: Douglas Miskowiak, Senior GIS Education Specialist

Course Dates/Times: Section 1. M,T,W,Th,F,**S** 10 – 12:30 in Science B338 & B308

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Course Overview

This course is an introduction to computer-based *geographic and land management information systems*. The components and functions of a geographic information system are defined and evaluated in relation to the needs of a natural resources or geographic information systems technician, analyst, or manager. The creation, acquisition, manipulation, aggregation, analysis, and presentation of geographic information (i.e. the management of a *Geographic Information System*) will be examined. The student will use ArcGIS Pro software to capture, encode, retrieve, process, analyze, and display geographic data.

Target Audience

This course is intended for those interested in learning the basic principles of using a Geographic Information System. The course is geared toward a perspective in natural resources, although the geographic concepts apply across professional disciplines.

Learning Outcomes

Learners will:

- Define Geographic Information System and Geographic Information Science.
- Describe the six fundamental components that comprise a functional GIS.
- Categorize the primary functions of a Geographic Information System.
- Illustrate the utility and pervasiveness of spatial thinking using applications-based examples.
- Present geographic information using maps and visual graphics.
- Compare and contrast the characteristics of the Vector and Raster data models.
- Classify measurement reference systems for geospatial phenomena.
- Read geospatial metadata to describe the who, what, when, where, and why of geospatial data.
- Describe the procedures for and consequences of flattening the ellipsoidal earth onto a flat map.
- Summarize administration of PLSS and land partitioning in the U.S. and Wisconsin.
- Manage data tables to search and query for geographic phenomena.
- Apply locational queries to identify geographic phenomena with certain spatial characteristics.
- Analyze spatial features using adjacency, proximity, containment, and overlay functions.
- Utilize Global Positioning Systems to collect information in the field.
- Share and Gather Geospatial Information Using the Network.

Course Format

This course is conducted face-to-face, but is supplemented with online materials. Course materials are available on the UWSP internet portal, CANVAS. It is used to circulate course information, lectures, and reading materials. CANVAS is used disseminate grades and to conduct some learning assessments. ***Contact your instructor if you need assistance with CANVAS.***

Lectures

Lecture materials concentrate on both the basic theoretical and applied techniques of a Geographic Information System used for land and resource management. Lectures provide the foundation of information needed to conduct and understand class exercises.

Expectations

- Attend daily lecture.
- Take your own personal notes in addition to the instructor's notes. (Translating the instructor's lecture into your own words is most helpful for comprehension).
- Ask questions if you don't understand something or want a different perspective.
- Participate in the classroom. Share your own perspectives.

Access Instructions

Lectures will be delivered in the class room and many lecture materials are available for download using CANVAS. Please be aware that some lectures may only be available online. Lecture materials are posted for each module under the *'Home'* heading.

1. Powerpoint: At the instructor's discretion, slides are available with additional notes.
2. Videos: At the instructor's discretion, some lectures will be made available using instructor voice-over audio and video.
3. Some lectures are accompanied by additional learning resources available on CANVAS.

Readings and Resources

Required reading materials include:

1. GIS Fundamentals, (4th edition) Paul Bolstad, White Bear Lake: Eider Press, 2012. *(University Text Rental Book)*
2. ArcGIS Pro quick-start tutorials, (ONLINE at http://pro.arcgis.com/en/pro-app/get-started/pro-quickstart-tutorials.htm)

Additional readings and resources are assigned each week to complement materials shared in lecture.

Expectations

- Examinations cover assigned readings and resources.
- Read materials prior to attending lecture and take personal notes.

Access Instructions

Assigned readings are shown below in the course outline. Additional reading materials may be assigned during the term. Besides the rental text, look for assigned readings and other resources using CANVAS for each module.

GIS Hands-On Exercises

Learners will complete hands-on exercises that each deal with an aspect of GIS and relate to lecture and reading materials. Hands-on exercises are conducted using the ArcGIS Pro quick-start tutorials from ESRI. Grading rubrics for each exercise is found on CANVAS under the Assignments tab. A **graded quiz** is associated with each set of hands on exercises. These quizzes are available on CANVAS. Students earn points by finishing the exercises and by taking the graded quizzes.

All students have a class folder made available on UWSP servers, often referred to as the Z drive. Students will download exercise data and projects and copy them to their personal student folder. Your instructor has created a video that shows you how to access data and where to copy data.

Expectations

- Exercises take 10 minutes to 45 minutes to complete.
- Project requirements are explained with each ESRI tutorial.
- A basic grading rubric will accompany each exercise to inform you how you will earn points.
- Exercises should be completed at or before the due date indicated on this syllabus or updated by the instructor. The digital timestamp is used to determine punctuality.
- Late assignments will NOT be assessed.

Access Instructions

1. **Exercise Instructions:** Exercise instructions are available from ESRI at http://pro.arcgis.com/en/pro-app/get-started/pro-quickstart-tutorials.htm
2. **Instructor Help:** Still can't figure it out. Email your instructor or the student tutor to work on finding a solution.
3. **Class Server:** Data, projects, and completed exercises are stored in a student class server subdirectory. Each student has a subdirectory located within the following server location **(z:\\uwsp.edu\files\CLS\GEO\classes2).** You are provided with a handout that describes connecting to this server (see CANVAS).
4. **Computing and Software Requirements:** Exercises require the use of campus computers and ArcPro software. Learners are expected to have a working knowledge of Windows 10 and can competently navigate through the Windows environment. ArcGIS Pro software is available in all general-purpose campus labs.

Self-Assessment (Practice) Quizzes

Test your comprehension of lecture materials by taking the ungraded self-assessment quizzes. You will have unlimited tries at each quiz. You will learn which questions you answered correctly and incorrectly to help you prepare for the exams.

Topical Examinations

There will be two topical examinations, a *mid-term*, covering the first half of the course, and a *final comprehensive exam*. The exam will test your understanding of GIS concepts and application of GIS concepts. A combination of multiple-choice, true/false, matching, and short answer questions should be expected. Topical exams are conducted via CANVAS and, like the quizzes, are available under the Quizzes heading.

Expectations

- Each exam will count for 15 percent of your final grade.
- The exam is available on CANVAS. The exam is timed. You have 60 minutes to complete topical exams. Once you begin the exam, you must finish it through to completion.
- You are allowed one 8.5 inch by 11 inch piece of paper in which to take notes – both sides. You are not allowed the use of software or electronic devices.

Applied Examinations

There will be two applied examinations, a *mid-term*, covering the first half of the course, and a *final comprehensive exam*. The exams will test your ability to perform a series of geospatial applications using ArcGIS Pro software. Applied exams are administered using your student folders. The applied examination is a take home exam. The exam question will be handed out to students one week before it is due. You are expected to conduct your own work without the assistance of other individual persons. The exam is open note and open book. You may use ArcGIS Online help. Applied examinations are found under the Assignments tab in CANVAS.

Expectations

- Each exam will count for 15 percent of your final grade.
- The exams are available on CANVAS > Assignments for you to review, practice and study.
- The exam will be administered as a take home exam.
- Your exam shall be saved to your student folders.

- **Plagarism and cheating are NOT tolerated. You are expected to directly and personally take the exam, take the exam alone and without assistance from others. You are not allowed to witness another person taking the exam.**
- **UWSP procedures will be followed if students are suspected of plagiarizing materials or cheating (see http://www.uwsp.edu/admin/stuaffairs/rights/rightsChap14.pdf).**
- **Penalties can include, but are not limited to: failing the exam, failing the course, and expulsion from the university.**
- **Please, do not risk your academic career.**

Evaluation and Grading

Hands-On Exercises	= 40
Midterm Topical Exam	= 15
Midterm Applied Exam	= 15
Final Topical Exam	= 15
Final Applied Exam	= 15
Total	100 Points

Ranges of percentages, course points and their equivalent letter grades are shown below. By referring to this table you can determine your letter-grade standing at any point in the course.

Percent	10 Points	15 Points	5 Points	Course Pts.	Letter Grade
93-100	9.3	14.0	4.65	93	A
90	9.0	13.5	4.5	90	A-
87	8.7	13.1	4.35	87	B+
83	8.3	12.5	4.15	83	B
80	8.0	12.0	4.0	80	B-
77	7.7	11.6	3.85	77	C+
73	7.3	11.0	3.65	73	C
70	7.0	10.5	3.5	70	C-
67	6.7	10.1	3.35	67	D+
63	6.3	9.5	3.15	63	D
<63	<6.3	<9.5	<3.15	<63	F

OUTLINE OF COURSE

Day	Topic	Readings/Resources	Exercise	Exercise Due Dates
1 1/2	Course Introduction & Overview of GIS. What is GIS? GIS Functions. GIS Applications.	1) Chapter 1. Pgs 1-20 2) GIS Functionality 3) *Watch Geospatial Revolution Videos Episodes 1, 2, 3, 4.*	Start the Learn the Basics Tutorials (Complete first five tutorials)	
2 1/3	Communicating with maps. Design and presentation strategies.	1) 131-140 & 164-171		
3 1/4	GIS Data Models.	1) 25-51, 140-154,	Start the Visualize tutorials (Complete all five tutorials)	**Learn the Basics first five tutorials. Due 1/4 at 1:00 pm.**
4 1/5 (Saturday)	Creating and Encoding the GIS Database.			
5 1/7	Appraising GIS Data.	1) 171 - 175 2) 561-571		**Visualize tutorials Due 1/7 at 1:00 pm.**

1/8	Performance Review Use this day to study for the topical exam and take the applied exam.			
7 1/9	**Midterm Topical Exam. 60 minutes in class (SCI B308).**	**Midterm Applied Exam due 1/9 at 12:30 pm.**		
8 1/10	Geospatial Location Reference Systems.	1) 71 -95	Start the Analyze tutorials (Complete two tutorials)	
9 1/11	Projections and Coordinate Systems.	1) 101 - 117 2) USGS Projections		
10 1/12 (Saturday)	Table Cardinality, Joins, Relates and Attribute Queries.	1) Chapter 8	(Hands-on Demonstrations)	**Analyze tutorials due Monday 1/12 at 1:00 pm.**
11 1/14	Vector Analysis: Adjacency, Proximity, Containment and Overlay.	1) 347-358, 368-389 2) Defining Planning Questions and Functions	(Hands-on Demonstrations) Start the Manage and edit data tutorials (Complete two tutorials)	
12 1/15	Global Positioning Systems.	1) 183-194, 206-216		
13 1/16	Public Land Survey System and Land Records.	1) 120-123		**Manage and edit data tutorials due 1/16 at 1:00 pm.**
14 1/17	Performance Review. Use this day to study for the topical exam and take the applied exam.			
15 1/18	Final Topical Exam	**Final Applied Exam due at 12:30 pm.**		

This schedule is tentative and is subject to modifications during the course of the semester.

IN THE EVENT OF AN EMERGENCY

Medical Emergency

Call 9-1-1 or use Red Emergency Phone. Red emergency phones are located in either direction (left/right) of the B228 and B328 classrooms. Offer assistance if trained and willing to do so. Guide emergency responders to victim.

Tornado Warning/Severe Weather

In the event of a tornado warning, proceed to the lowest level interior room without window exposure. The 2nd floor of the Science Building just outside B228 serves as a severe weather/tornado shelter. See www.uwsp.edu/rmgt/Pages/em/procedures/other/floor-plans.aspx for floor plans showing severe weather shelters on campus. Avoid wide-span structures (gyms, pools or large classrooms).

Fire

In the event of a fire alarm, evacuate the building in a calm manner.

Active Shooter/Code React

Run/Escape, Hide, Fight. If trapped hide, lock doors, turn off lights, spread out and remain quiet. Call 9-1-1 when it is safe to do so. Follow instructions of emergency responders. See UW-Stevens Point Emergency Procedures at www.uwsp.edu/rmgt/Pages/em/procedures for details on all emergency response at UW-Stevens Point."