

# Geography 241: Fundamentals of Geographic Information Systems

## Winter 2019 (Section 1)

<b>Instructor:</b>	Douglas Miskowiak, Senior GIS Education Specialist
<b>Course Dates/Times:</b>	Section 1. M,T,W,Th,F,S 10 – 12:30 in Science B338 & B308
<b>Office Hours:</b>	Please email me to schedule office hours by appointment
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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. Some lectures are accompanied by additional learning resources available on CANVAS.

## Readings and Resources

Required reading materials include:

1. GIS Workflows, (available on Canvas)

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 GIS Workflows manual offered on Canvas. Grading rubrics for each exercise are found on CANVAS under the Assignments tab. A **graded quiz** is associated with each hands-on exercise. 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. Data are made available to students in which to complete the exercises. Your instructor will demonstrate how to access data.

### *Expectations*

- Exercises take 2-4 hours to complete.
- Project requirements are explained with each tutorial.
- A 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 on Canvas.
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 instructions that describe how to connect to this server (see CANVAS).
4. **Computing and Software Requirements:** Exercises require the use of campus computers and ArcGIS Pro 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 20 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.
- Exams are open-note, open-book, open software.
- **Plagiarism 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 (4)	= 60
Midterm Topical Exam	= 20
Final Topical Exam	= 20

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Total	100 Points
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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.

<u>Percent</u>	<u>10 Points</u>	<u>15 Points</u>	<u>5 Points</u>	<u>Course Pts.</u>	<u>Letter Grade</u>
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 ½ Thursday	Course Introduction & Overview of GIS. What is GIS? GIS Functions. GIS Applications.	<i>Watch Geospatial Revolution Videos Episodes 1, 2, 3, 4.</i>	Start the Create an Effective Map GIS Workflows Exercise	
2 1/3 Friday	Communicating with maps. Design and presentation strategies.			
3 ¼ Saturday	GIS Data Models.		Start the Digitizing from a Basemap GIS Workflows Exercise	<b>Create an Effective Map. Due 1/4 at 1:00 pm.</b>
4 1/6 Monday	Creating and Encoding the GIS Database.			
5 1/7 Tuesday	Appraising GIS Data.			<b>Digitizing from a Basemap. Due 1/7 at 1:00 pm.</b>
1/8 Wednesday	Performance Review. Use this day to study for the topical exam.			
<b>7 1/9 Thursday</b>	<b>Midterm Topical Exam. 60 minutes in class (SCI B308).</b>			
8 1/10 Friday	Geospatial Location Reference Systems.		Start the Vector Spatial Analysis GIS Workflows Exercise	
9 1/11 Saturday	Projections and Coordinate Systems.	USGS Projections		
10 1/13 Monday	Table Cardinality, Joins, Relates and Attribute Queries.			<b>Vector Spatial Analysis. Due Monday 1/13 at 1:00 pm.</b>
11 1/14 Tuesday	Vector Analysis: Adjacency, Proximity, Containment and Overlay.	Defining Planning Questions and Functions	Start the Integrating Geospatial Technologies GIS Workflows Exercise	
12 1/15 Wednesday	Global Positioning Systems.			
13 1/16 Thursday	Public Land Survey System and Land Records.			<b>Integrating Geospatial Technologies. Due 1/16 at 1:00 pm.</b>
<b>15 1/17</b>	<b>Final Topical Exam 60 minutes in class (SCI B308).</b>			

*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 2<sup>nd</sup> 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](http://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](http://www.uwsp.edu/rmgt/Pages/em/procedures) for details on all emergency response at UW-Stevens Point.”