UP 6700 & GPH 3600
Introduction to Geographic Information Systems

Winter 2024
Urban Studies & Planning
Wayne State University

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Introduction:

Geographic Information Systems or GIS is a computerized tool used to capture, manage, analyze, and display geographically referenced data. It allows you to identify and understand geographic patterns, distributions, and relationships in your data. The system consists of computer hardware, software, data, and methods. The course will focus on GIS data input, management, analysis, and output of geographic data. You will learn GIS terms, concepts and applications and how to use a GIS software application.

There will be class lectures and GIS application demonstrations. Lectures will introduce GIS terms, concepts, and applications. Software demonstrations will introduce students to the Esri ArcGIS Pro application, and how to use core tools for geographic analysis and mapping.

The class will be taught asynchronous online. Lectures and demonstrations will be recorded through Echo360 and placed on Canvas. Students are expected to view them. A Discussion board on Canvas will be available to discuss and ask questions about each lecture and demonstration. Individual Zoom meetings will be an option to go over the course materials with the instructor.

Prerequisites:

No previous experience using a GIS application is required.

Students are required to have their own access to the ArcGIS Pro application. It will be made available for you to install on your computer. It is a Windows program, and it will not operate on a Mac. Access to a university computer through a VMware connection with the application installed will be available as a second option. You will use ArcGIS Pro to complete class demonstrations, assigned tutorials and a class project. You will not be able to complete this class without the ArcGIS Pro application.

If you do not have a computer capable of running ArcGIS Pro or accessing it through a VMWare connection, please take the on campus offering for this class. An announcement will be made that will provide you the requirements needed for your computer. You will need to check your computer's

specifications immediately with the software requirements. And check to see if you are able to access the application through our VMWare connection. An announcement will be sent on how to do this too.

Learning Outcomes:

The course will introduce students to GIS. There are three key learning outcomes:

1. Students will recognize and understand GIS terms, concepts, and methods.

2. Students will understand core GIS tools used to analyze geographic data.

3. Students will be able to apply basic tools from the Esri ArcGIS Pro application to analyze geographic data and create maps.

Lectures will introduce terms, concepts and applications. Workbook assignments, ArcGIS Pro software demonstrations and a GIS course project will teach you the tools and skills.

Required Text:

Getting to Know ArcGIS Pro 2.8, fourth edition, Michael Law, Amy Collins

ISBN: 9781589487017, e-ISBN: 9781589487024, Esri Press, 2021
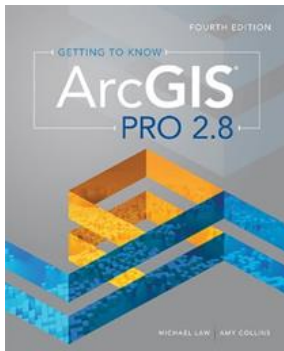
Required Data:

Data for the book can be downloaded from the Modules section or from the following site. It is used to complete the exercises in the book.

Getting to Know ArcGIS Pro 2.8 - Exercise data - OverviewLinks to an external site.

Grading:

Grades are based on the following:

	Grading	Percent (%)
(1)	Test 1 (Lectures 1 - 4)	25
(2)	Test 2 (Lectures 5 - 8)	25
(3)	Chapters 1 - 5: "Getting to Know ArcGIS Pro" Questions	10
(4)	Chapters 6 - 10: "Getting to Know ArcGIS Pro" Questions	10
(5)	Location Analysis Project	30

Schedule:

Week 1 – *January 8 - 12*

Course Introduction

Lecture 1: GIS Overview
GIS Overview
Data Input
Data Storage and Management
Data Manipulation and Analysis
Data Output
Elements of a GIS

Demo: ArcGIS Pro Introduction
Demo: Project Data

Week 2 – *January 15 - 19*

Lecture 2: Data Models & Map Scale
Map Layers
Attribute Tables
Map Scale
Vector and Raster Data Models
Topology

Demo: Table Join and Relate

Week 3 – *January 22 - 26*

Work on project

Demo: Location Analysis
Demo: Location Analysis Maps

Week 4 – *January 29 - February 2*

Lecture 3: Georeferenced Data & Map Projections
Georeferencing Systems
Address Geocoding
Latitude and Longitude
Geographic Quadrants
Map Projections

Demo: Geocoding
Demo: Map Projections

Week 5 – *February 5 - 9*

Lecture 4: Data Input
Acquiring GIS Data
Data Quality Factors
Medadata
Categorizing Maps
Digitizing Maps

Demo: Data Extraction
Demo: Digitizing

Week 6 – *February 12 - 16*

Due February 12: Chapters 1 - 5: "Getting to Know ArcGIS Pro" Questions

Work on project

Week 7 – *February 19 - 23*

Test 1 - Lectures 1 through 4

Lecture 5: Data Management
Geodata
Data Storage Options
Individual File Types
Accessing Data Online

Week 8 – February 26 - *March 1*

Lecture 6: Spatial Analysis Overview
GIS Analysis Overview
Defining your Analysis
Multiple Step Analysis
Proximity Analysis
Overlay Analysis

Week 9 – *March 4 - 8*

Work on project

Demo: Buffers
Demo: Intersect
Demo: Summary Statistics

Week 10 – *March 11 - 15*

Holiday - no class

Week 11 – *March 18 - 22*

Lecture 7: Overlay & Proximity Analysis
Point, Line and Polygon Overlay
Intersect and Union
Silver Polygons
Buffering Features
Dissolve Features

Week 12 – *March 25 - 29*

Lecture 8: Cartography
Creating Maps
Labels, Symbols and Colors
Basic Map Principles
Cartographic Elements
Map Design

Demo: Layouts

Week 13 – *April 1 - 5*

Week 14 – *April 8 - 12*

Due April 8: Location Analysis Project

Due April 1: Chapters 6 - 10: "Getting to Know ArcGIS Pro" Questions

Work on project

Week 15 – *April 15 - 19*

Test 2 - Lectures 5 through 8

Week 16 – *April 22 - 26*

No class

Academic Dishonesty:

(Edited statement from the DOSO's web site)

All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct. Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

- Cheating: intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student's test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.

- Fabrication: intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.

- Plagiarism: to take and use another's words or ideas as one's own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

- Unauthorized reuse of work product: submission for academic credit, without the prior permission of the instructor, of substantial work previously submitted for credit in another course. Example: submitting a paper in a current course that was written for, and submitted in, a previous course.

- Other forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student's access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records

Student Disabilities Services:

(Edited statement from the SDS web site)

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The SDS office is located in the Adamany Undergraduate Library. The SDS telephone number is 313-577-1851 or 313-577-3365 (TTD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours or at another agreed upon time to discuss your needs.

Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student's accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.