

GEOG/ESE 379: Intro to GIS Systems

[Fall / Year]

Lecture:

[Days and Times]

Lab sections:

[Days and Times]

Learner-Centered Syllabus
Revision Project for EOL585
College Teaching Class.

Original Syllabus from Dr. Shakil
Kashem

Instructor Contact Information

Instructor: Rebecca Shakespeare (shakesp2@illinois.edu)

Phone:

Office: 254 Computer Application Building, 605 East Springfield Avenue Champaign, IL 61820

Office Hours: [Days and Times]

Please come to my office hours; face-to-face conversations are the most efficient way for me to help you to understand the material and address any challenges you encounter. You are welcome to come to office hours if you want to talk about how to use GIS for a project outside of class. If you are unable to come to my scheduled office hours, please email me and we can find a different time to meet. I encourage you to contact me by email with questions, concerns, and challenges you encounter in this class; I will reply within 48 hours.

Your Teaching Assistants' office hours and contact information can be found on the course website and will be announced during your first lab section. Your TAs are great resources for helping with assignments and helping you with ArcGIS and other software. TA office hours will be in the classroom lab (338 Davenport Hall), and you are invited to use the computer lab at those times.

Course Description

Welcome to your semester-long adventure into GIS technologies and applied methods!

GIS refers to Geographic Information Systems (the technology) and to Geographic Information Sciences (the inquiry and analysis). These have **wide-ranging uses in many disciplines**, industries, and in your own life, from studying the spread of disease to selecting a new location for a grocery store, and from remotely assessing crop health to finding the shortest route home. This class let you take on roles of GIS professionals, and professionals who use GIS, letting you learn GIS techniques by using them in real-life scenarios.

In lectures, you will develop knowledge of **how GIS was developed**, how its databases are structured, and how GIS data is created, stored, and used. In weekly lab sessions, you will gain **hands-on experience working with GIS software**, using it how a marketing specialist, ecologist, urban planner, or emergency manager would. You'll also gain practical experience working with cartography and spatial analysis, **making maps and performing guided analyses**. While this class is not all-inclusive, by the end of the semester you will have the ability to ask geospatial

questions, perform your own spatial analyses, make your own maps, and be prepared to take more advanced GIS courses.

Course Objectives

By the end of this course, you will be able to:

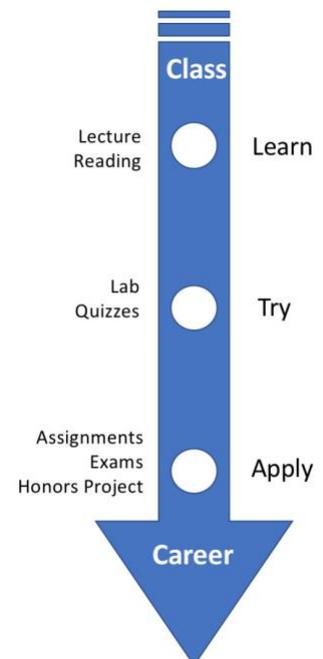
1. **Recognize** the types of situations and problems that benefit from GIS methods.
2. **Formulate** approaches to analyze a range of geospatial problems.
3. **Identify, process, and analyze** geographic information in both raster and vector formats.
4. **Create** legible maps in a commercial software package for a variety of purposes.
5. **Summarize** fundamentals of how geographic information is created, stored, and georeferenced within GIS.
6. **Troubleshoot** common problems in GIS software and data management.

Course Format

To keep you on track to achieving these course objectives, you will have **two lectures and one lab session each week**. These provide opportunities for you to encounter, engage with, and try out GIS techniques. Readings, quizzes, assignments and exams give you the opportunity to independently encounter the material. Each of these activities moves you one step closer to developing skills you will be able to deploy in your own research and in your career.

In lecture, you will encounter the theory behind GIS, learn about the techniques you will try out in lab, and discuss and explore different applications of GIS in research and industry. To prepare for lectures, read the assigned texts before you get to class and reflect on your lab experiences. Make note of terms and concepts that you do not understand. Reflect on how you might use these techniques in your own discipline. During lecture, think about how presented methods impact your own life and work – from the GPS in your car to the way that you read a map. Participate by asking your reading questions, seeking clarification, and asking how this might apply in a different situation.

In labs, you will apply your knowledge of theory to real-world situations using GIS software. Using guided tutorials, you will take on the role of professionals who use GIS in their day-to-day work. While you follow tutorial instructions, think about why the tutorial guide is instructing to do particular things. Take opportunities to explain what you are doing to your TA or to your neighbor. Work to remain engaged in the tutorials and focus not only on the steps you need to take but the rationale for taking them. This engagement will prepare you to independently use GIS for assignments and in the future.



Learning GIS

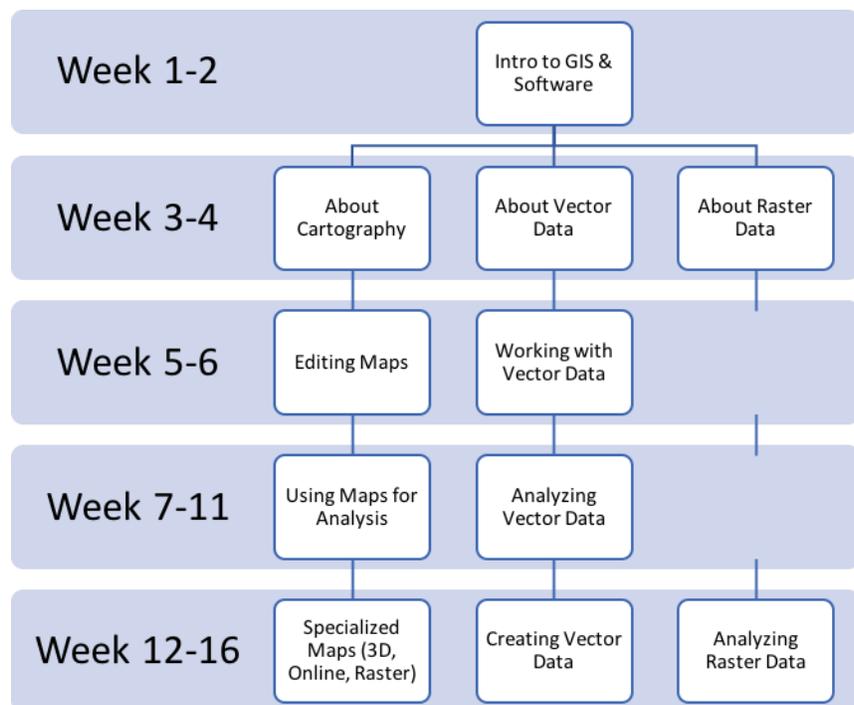
GIS software takes regular practice to master, and this class may be the first time you try using it. Recall the first time you tried to dribble a soccer or a basketball. Conjure images of the first time you played an instrument or cooked a meal. At one point, you were a novice, and basic skills were hard. Even though you are a frequent computer or smartphone user, you are a beginner GIS user, and it will take patience and determination to get comfortable with basic skills. **To take ownership of your education in this class, you will need to set aside time outside of class meetings to practice using GIS software** by reviewing lab exercises, working on assignments, or even taking on an independent or honors project. GIS professionals will tell you to plan extra time for any task – and they know it! Give yourself plenty of time to learn and you will be pleased with how much you grow over the semester.

Prerequisites

There are no prerequisites for this class. All students are expected to have familiarity with working on a PC, organizing files, and saving files to a USB drive or a shared drive. If you are concerned about these, please let me or your TA know during the first week of class, and we will work with you to get you up to speed.

Course Outline

This course moves stepwise through a sequence of map-based skills, working first with vector and then with raster format data. The following diagram displays how you will “level up” your GIS skills over the course of the semester. The course outline that follows details weekly reading, the hands-on role you will focus on, lab and lecture topics, and exam dates.



Learning Resources

Textbooks

There are two required textbooks for this course. They are available at the bookstore, but you may be able to find less expensive versions online. You will need to have them by the third

week of class – the first two weeks of reading and labs will be posted in PDF format on the course website to give you extra time for shipping, etc.

P. Bolstad (2012). GIS Fundamentals: A First Text on Geographic Information Systems, 4th edition. White Bear Lake, MN: Eider Press.	Bolstad (2012) covers GIS theory, and will serve as a useful reference if you take more advanced GIS classes. It is available in both hard copy and digital format.
M. Law and A. Collins (2017). Getting to Know ArcGIS for Desktop, 4th edition. Redlands, CA: ESRI Press. ISBN: 9781589483088	Law & Collins (2017) serves as the lab manual for this class, and contains tutorials on basic operations of the ArcGIS software suite. It is very important that you get the 4th Edition of the manual for this course. If you are able to find a used version of this manual, it is ok if it does not come with its original CD of exercises. These are easily accessed from the ArcGIS website, and will be posted on the course website for convenience.

Software

We will be using ArcGIS version 10.3 or 10.4 (both available from the Webstore and not significantly different from version 10.1). This software is available on the computers in Davenport 388 and is also on computers in select computer labs on campus (see the course website under ‘where to access ArcGIS’). **By the second week of class, you should identify at least two different computers you can use ArcGIS on outside of class time.** These can include:

- 1) Installing ArcGIS version 10.3 or 10.4 on your personal computer (this may take a couple of hours, so plan accordingly)
- 2) Remotely accessing a course virtual machine or remote access computer at ACES (look at the course website under ‘where to access ArcGIS’)
- 3) An on-campus computer lab with ArcGIS
- 4) A computer at the Scholarly Commons

Knowing which on-campus computer you will use if your computer crashes and having an alternative plan if the lab you like is closed will help you stay calm and focused while you work on class assignments.

Other supplies

You will need to save your coursework in a location other than the classroom computer lab. Plan to bring a portable USB flash drive to class or have a U of I Box account set up to safely store your work.

Course Communication

Course Website

The course website will have a list of all activities for lab and lecture each week. It is also an official course communication method. Be sure to check the course website frequently – at least once every 2 days – during the semester. Your grades will be posted here regularly so you will be able to keep track of your performance in the course.

University Email

Be sure to check your university email account daily. University email is also an official course communication method. Please use your university email address when you contact me or your TA - it is far more efficient if we have access to your university email address when communicating with you because it is easy to look up email address on Moodle or the university registration system in order to fix problem.

Q&A

If you have a question, it is likely that everyone in the class will benefit from the answer. The course website on Moodle has a Q&A board for your assignment, tutorial, and reading questions. Please post questions here first, before contacting me or your TA. I or one of your TAs will reply to Q&A board posts within 24 hours (note that this is a much faster guaranteed response time email). Please subscribe to the Q&A board, and post responses to your classmates' questions if you know the answers!

Of course, questions regarding individual grades or personal issues should still be emailed directly to me.

Grading Summary

Grades will be posted on the course website as soon as all students' work has been graded. Please check your grades and read the comments on your assignments.

The point distribution for the course is:

Assignment	Points
Midterm exam 1	200
Midterm exam 2	200
Final exam	200
Lecture quizzes (best 4 @ 25 points)	100
Lab tasks (10 points per week)	100
Lab assignments (5 @ 40 points)	200
Total	1000

Grading Scale

Letter	Points
A	900 and above
B	800 and above
C	700 and above
D	600 and above
F	599 and below

Extra credit points will be available for: additional lab tasks, lecture attendance quizzes. Additional extra credit opportunities may be available during the semester.

Exam

Each exam will cover material encountered since the previous exam – exams (including the final exam) are not cumulative. Exams will cover the lecture material, assigned readings, and will ask you to recall procedures and approaches you practice in lab sessions. They will have multiple choice, true/false and short answer questions, and you may need to draw diagrams or maps similar to ones you will have seen in lecture or lab sections.

Quizzes

Five online quizzes give you the opportunity to test your recall of reading and lecture topics, particularly focusing on GIS theory. These quizzes are not cumulative and will only cover material since the last quiz or exam. Quizzes must be completed by 5:00 pm on the Friday of the week they are assigned. They cannot be made up, but the lowest quiz score will be dropped. The answers to the quizzes will be made available for your review, but only after the quiz has closed for everyone. Quizzes are individual assignments. They are open book and open notes, but consultation or collaboration with others (whether they are students or people outside of the course) is an academic integrity violation and will be treated as such.

Assignments

Five major assignments will be turned in for a grade. Each of these assignments is worth 40 points. These assignments will focus on the technical aspects of using software to answer a geographic question and/or create a cartographic product. Each assignment is given two weeks before it is due; you will have encountered all of the techniques you need to complete the assignment by the end your lab session the week the assignment is given.

Lab Tasks

Lab tasks are short tasks that show that you have completed the tutorials in your lab section. At the beginning of the lab sessions the Teaching Assistant (TA) will specify the lab tasks. By the end of the lab session you will show your completed tasks to the TA. You will earn full credit for the lab tasks by successfully completing the tasks at least ten (10) times throughout the semester (10 points each). Additional lab task completions will count as 5 points extra credit, added on top of the total score of 1000. Even if you do not get lab tasks for a week, I expect that you will complete the tutorials so you come to the next week's lab session as prepared as your classmates.

In-class Quizzes (Extra Credit)

In-class quizzes (lectures only) are an opportunity for one or two extra credit points each lecture. These quizzes are for extra credit and add on top of the total score (1000) for this course.

Honors Credit

This is an excellent course to receive honor's credit if you need it. Please see the page James Scholar Honors Credit (on course website) for more information.

Course Policies

Make-Up Exam and Late Work Policy

The Department of Geography does not allow make-up exams except for students in special circumstances and at the discretion of the instructor. These circumstances include (1) the death or illness of a family member, (2) illness of the student, (3) three or more final examinations on the same day, and (4) participation in a university sponsored activity at the same time as the regularly scheduled examination. Make-up exams will not be granted for personal convenience or for personal travel. Make-up exams will also only be granted if the student can document one of the situations described above. Advanced arrangements must be made for situations (3) and (4). If you miss an exam for situations (1) or (2), the instructor must be notified by the end of the workday of the exam either by phone or by email. The missed exam must be made up within one week. Contact the instructor in order to schedule the make-up exam. Tests that are not made up within a week will be graded as a zero.

Skills that you develop in lab sessions are cumulative: each week builds on skills you have learned in previous weeks. It is very important that you complete the assigned lab activities on time and in the sequence that they are assigned.

Lab task credit is given only for students present in the lab session. You may need extra time after lab sessions to complete your lab tasks. Please check in with your TA at the end of a lab session to let them know that you will be submitting lab tasks to them after lab. Lab tasks must be turned in before your next scheduled lab session to be counted for credit.

Assignments will be accepted up to one week late, with deductions as follows: up to 48 hours late for a 4-point penalty; up to 48 hours to 1 week late for a 10-point penalty. Assignments more than one week late will not be accepted.

Lab Policies

Students are to obey all department policies regarding the use of the GIS lab. NO FOOD OR DRINK IS PERMITTED IN THE LABS. Because of the number of classes taught in the lab, it is generally not available for use outside of class time. However, ArcGIS software is available on nearly every computer on campus. The recommended location for working on lab exercises outside of lab sessions is ATLAS's G8 Computing Lab, located in the basement of the Foreign Languages Building.

Plagiarism and Academic Dishonesty

To claim as one's own the ideas or words of another is plagiarism. Plagiarism is defined as the following:

1. using the exact words of another person's work/writing without acknowledgment of your source through the use of quotation marks and correct citation/documentation;

2. rephrasing a passage of another writer without giving proper credit; - using someone else's facts or ideas without acknowledgment;
3. using a piece of writing for one course that was already used in a previous course (or in courses in which you are simultaneously enrolled) without expressed permission from both instructors to do so;
4. turning in papers or other assignments from "paper mills" or "paper banks" such as those available for purchase from online databases, or where "ghostwriting" services can be acquired;
5. presenting fabricated or falsified citations or materials.

Please consult with me or use university library services if you are unsure about how to document sources. I may use different methods of detecting plagiarism and other academic dishonesty, including electronic plagiarism detection software. In accordance with University policies, students who submit a plagiarized assignment shall receive an "F" with a numerical value of zero on the item submitted, and "F" shall be used to determine the final course grade. You may fail the class if you plagiarize. **Worse, you will not have learned all of the cool stuff that GIS can do and will not be able to demonstrate those skills to a future employer.**

Other forms of academic dishonesty will not be tolerated in class, including, but not limited to, cheating on exams, the fabrication of data, information, or citations in any formal academic exercise, deception (such as providing false information to the instructor concerning exercises - e.g. giving a false excuse for missing a deadline or falsely claiming to have submitted work), the sabotage of other students from completing their assignments, or the impersonation of another student for the purposes of completing an exam or other assignment. Be honest and work hard.

Please review the University's academic dishonesty policies and procedures. They are all in force for this course. If you have any questions about whether an activity might constitute academic misconduct, ask me before you do it.

Classroom Conduct

Beyond the requirements of academic honesty, as a member of the learning community, you have a responsibility to other members this classroom community. All students are expected to comport themselves in a dignified and professional manner. In this class, we will all treat each other with respect. This includes silencing cell phones during class, listening when someone else is talking, actively (but quietly) listening during lecture or lab presentations, raising your hand to ask a question or contest a statement, and keeping loud conversations to a minimum during lab sections.

Research shows that, while we would like to think we can multitask with technology, we are ultimately less efficient at all of our endeavors. Refrain from talking on the telephone, sending

text messages, IMing, using Facebook, Twitter, personal email, etc., while in class. This is distracting to you, but it is also distracting to students who are sitting near or behind you.

You may choose to use electronic methods for note taking or to use the internet or your phone to find information relevant to the lecture or classroom discussion. This is fine as long as it does not detract from your, or your neighbors, learning experience, but consider if you will learn more, more efficiently, with paper and pencil note-taking.

Policy Regarding Recording Any Face to Face Interactions

If you would like to audio record lectures or office hours for your own study, please consult with me before you do. Recording devices may make other students uncomfortable and hinder their willingness to participate actively in class, for this reason they may only be used with approval. Any approved recordings may only be used for the personal study or research and may not be distributed or otherwise circulated to any third party in any manner whatsoever. Video recordings are prohibited. Further, the lecture material is the intellectual property of the instructor and they holds the copyright for it. Under no circumstances are notes or recordings from the class authorized to be sold.

Disability Policy

Students with a disability in this class are encouraged to meet with the instructor privately during the first week of class to discuss reasonable accommodations. Course requirements cannot be waived, but reasonable accommodations may be provided based on disability documentation and course objectives. Accommodations cannot be made retroactively. Students seeking reasonable accommodations due to disability are referred to the university's disability office in order to discuss their particular needs and also to obtain any documentation necessary for the instructor when the semester begins.

Disclaimer

This syllabus (including course requirements, class policies, and course schedule) is subject to change. You will be notified of any changes through classroom announcement and/or electronic notification through official channels. The announcement of information during any face-to-face meeting (including lectures and lab sessions) is an official communication channel for information in this course. If you miss a lecture or lab, it is your responsibility to contact a classmate, me or your TA to check if there were any announcements or new information given in class. Not being present to receive such information is not a valid excuse for not having the most updated information.

Course Schedule

Abbreviations:

PB: P. Bolstad (2012). GIS Fundamentals: A First Text on Geographic Information Systems, 4th edition. White Bear Lake, MN: Eider Press.

MA: M. Law and A. Collins (2013). Getting to Know ArcGIS for Desktop, 3rd edition. Redlands, CA: ESRI Press. ISBN: 9781589483088

BD: B.D. Dent (1999). Cartography: Thematic Map Design, 5th Edition, WCB/McGraw-Hill (on course website)

Week & Hands-on role	Reading (by Monday)	Monday Lecture	Wednesday Lecture	Lab	Homework & Deadlines
Week 1 Aug 28 GIS Intern	PB Ch.1 - An Introduction to GIS	Introduction to Course and GIS Overview	Basics of GIS Data and ArcGIS	MA Ch.1 - Introducing GIS MA Ch. 2 - Introducing ArcGIS	Get ArcGIS to work somewhere else
Week 2 Sept 4 GIS Intern		LABOR DAY	Geodesy	MA Ch. 3 - Interacting with Maps MA Ch. 4 - Interacting with Data MA Ch. 5 - Exploring Online Resources (Optional)	
Week 3 Sept 11 Graphic Designer	PB Ch. 4, Section 4, Subsection 1 - Cartography and Map Design BD Ch 7: The Choropleth Map	Basics of Mapping	Choropleth Mapping	MA Ch. 7 - Symbolizing Features MA Ch. 9 - Labeling Features	Quiz 1 Lab 1 assigned
Week 4 Sept 18 Ecology Grad Student	PB Ch. 2, Section 2 - Common Spatial Data Models PB Ch. 2, Section 3 - Vector Data Model	The Vector Data Model and Geometric Representation	The Vector Data Model and Attribute Information	MA Ch. 8 - Classifying Features MA Ch. 10 - Making Maps for Presentation	Lab-1 Due on Friday
Week 5 Sept 25 Government Contractor	PB Ch. 8: Attribute Data and Tables	Table Joins and Spatial Joins	MIDTERM 1	MA Ch. 16 - Joining and Relating Data	Lab-2 Assigned

Week 6 Oct 2 Urban planner / Developer	PB Ch. 4, Section 1 - Building a GIS Database PB Ch. 4, Section 2 - Digitizing and Coordinate Capture	Vector Data File Formats and GIS Data Sources	Creating and Documenting Vector Datasets	MA Ch. 11 – Building Geodatabase MA Ch. 12 - Creating Features MA Ch. 13 - Editing Features and Attributes	Quiz-2 due on Friday Lab-2 due on Friday
Week 7 Oct 9 Department of Labor employee	PB Ch. 9, Section 1 – Introduction PB Ch. 9, Section 2 - Selection and Classification PB Ch. 9, Section 3- Dissolve	The Core GIS Vector Toolkit and Selecting GIS Data	Geoprocessing Tools-1	MA Ch. 17 - Selecting Features by Location MA Ch. 18 - Preparing Data for Analysis Illinois Spatial Data	Quiz-3 due on Friday
Week 8 Oct 16 Emergency management	PB Ch. 9, Section 4- Proximity Functions and Buffering PB Ch. 9, Section 5- Overlay	Geoprocessing Tools-2	Geospatial Problem Solving	MA Ch. 19 - Analyzing Spatial Data	Lab-3 Assigned
Week 9 Oct 23 Cartographer	PB Ch. 3 Section 2 - Map Projections and Coordinate Systems (pages 101 to 123)	Determining Position	Map Scale and Projections	MA Ch. 6 - Working with Coordinate Systems and Projections	
Week 10 Oct 30 Marketing specialist		MIDTERM 2	Geocoding	MA Ch. 14 - Geocoding Addresses MA Ch. 15 - Querying Data	Lab-3 due on Friday
Week 11 Nov 6 Logistics manager	PB Ch. 9, Section 6 - Network Analysis	Network Analysis	Geodesy	ESRI Network Analyst Tutorial	
Week 12 Nov 13	PB Ch. 2, Section 3 -	The Raster Data Model	Raster Processing	Tutorials on course website	Quiz-4 due on Friday

Ecologist	Raster Data Model PB Ch. 9, Section 5, Subsection 1 - Raster Overlay PB Ch. 10 - Topics in Raster Analysis				Lab-4 Assigned
Week 13 Thkgvg					
Week 14 Nov 27 High School Teacher	PB Ch. 5 - Global Navigation Satellite Systems and Coordinate Surveying	Steps of GIS Problem Solving and Change Detection	The Global Positioning System	Field Data Collection Using ArcGIS	Lab-4 due on Friday
Week 15 Dec 4 Park Manager		The Basics of Remote Sensing	3D GIS	ESRI course: 3D Visualization Technique Using ArcGIS & NDVI Exercises	Quiz-5 due on Friday Lab-5 Assigned
Week 16 Dec 11 (M + W only)		Big Data and CyberGIS	Course Wrap-up	Viewshed Analysis and Visualization in CyberGIS Gateway (NO LAB SESSIONS)	Lab-5 due