

GEOG/ESE 379: Intro to GIS Systems

Fall 2017

Lecture: Monday and Wednesday, 10:00AM-10:50AM, 2 Education Building

Instructor: Dr. Shakil Bin Kashem (kashem1@illinois.edu)

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

Office hours: Thursday, 3:00PM-5:00PM

Lab sections and Teaching Assistants:

Hao Hu (haohu3@illinois.edu):

Lab: Wednesday, 2:00PM-3:50PM, 338 Davenport Hall

Friday, 12:00PM-01:50PM, 338 Davenport Hall

Office Hours: Friday, 2:00PM-4:00PM, 338 Davenport Hall

Rebecca Shakespeare (shakesp2@illinois.edu):

Lab: Thursday, 9:00AM-10:50AM, 338 Davenport Hall

Friday, 10:00AM-11:50AM, 338 Davenport Hall

Office Hours: Wednesday, 4:00PM-6:00PM, 338 Davenport Hall

Course Description:

This course is an introduction to the concepts underlying geographic information systems (GIS). The lecture portion of the course is designed to provide students with foundational knowledge about the roots of GIS in analytical cartography and also expose them to how geographic information can be used to answer questions and solve problems. The laboratory component of the class is designed to complement the lecture material and provide students with practical experience applying the concepts discussed in class by executing GIS procedures within ESRI's ArcGIS software package. This course syllabus outlines the overall course format, requirements, and policies. For detail contents throughout the semester please look at the 'Course Outline' page on course website at learn.illinois.edu.

Course Objectives

This course has the following objectives:

- Students will learn the fundamentals of how geographic information is stored and georeferenced within GIS.
- Students will learn the basics of creating maps in a commercial software package.
- Students will develop the ability to process and analyze geographic information in both raster and vector formats.
- Students will learn about different geographic information programs and services commonly available through the Internet and cell phones today.

Course Format

This course consists of both lecture and laboratory sections. There will be two lecture and one lab sessions each week. The course website on Moodle platform (at <https://learn.illinois.edu/>) will organize all of the activities and assignments on a weekly basis and be used also to record grades. You should check the Moodle website at least daily and for certain once early in the week so you know the schedule of assignments and activities for the week.

Please be aware of the time commitment this course requires. The traditional “rule of thumb” for calculating the amount of time a course requires is to generally assume you will spend two hours outside of class for every one hour spent in class every week. (That is why 12 hours per semester is considered a “full time” student, because 12 hours in class plus 24 hours outside of class is 36 hours a week, or about a 40 hour work week). Therefore, you should expect to spend about 12 hours a week on this course each week, give or take some in any particular week.

Prerequisites

There are no prerequisites for this class.

Textbooks

There are two required textbooks for this course. The first is a book that covers GIS theory:

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

This book is available in both hard copy and digital format. The first few chapters of this book will be made available on course website, so if you need a little extra time to purchase the textbook, you can reference the PDFs for the start of the course.

The other is a lab manual that will be used for its tutorials on basic operations of the ArcGIS software suite. This software suite is complex, especially for those who do not have previous experience working with such robust software packages. Therefore it is very important that you obtain the correct version of the software and laboratory manual being used in this course. We will be using ArcGIS version 10.3 or 10.4 (both available from the Webstore and not significantly different from version 10.1) and so that lab manual is as follows:

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

Other Materials

A portable USB flash drive to save your laboratory work if you are working on laboratory computers will be very useful. You can also use U of I Box to save your lab works.

Very Important Note: We will be using an industry standard software package for the laboratory component of this course. This is ESRI's ArcGIS software platform. The University does have a site license for ArcGIS and so it is available for free to all students to install on their personal computers through the Webstore. It is also available in most computer labs on campus. However, it is available ONLY for the Windows operating system. It is not available for Mac. If you have a Mac and want to install ArcGIS you will have to run Boot Camp or Parallels. This is your own responsibility to set up if you choose to do so. Otherwise, it is your responsibility to secure access to a Windows PC running ArcGIS should you need to work on tutorial and laboratory assignments outside of class. Please also note that it can sometimes take a couple of hours or more to download and install ArcGIS on your own computer, so please plan accordingly.

You can also access ArcGIS through the Virtual Machines made available by ATLAS for this course. Please look at the ‘Accessing Virtual Machines’ page for detail instructions.

Moodle and University Email

The University's Moodle system will be used to distribute course materials, assignments, and to keep students informed of their grades. You are responsible for checking it regularly, as this is an official method for communication between the instructors and students for this course.

Additionally, please check your university email account daily. University email is also an official course communication method. Please use your university email address when emailing your instructors. It is the university's official channel for university-related communications, but moreover, it is far more efficient if your instructors 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.

The Q&A Forum

In order to increase the efficiency, this course has a Q&A Forum for posting questions about the course. Chances are, if you have a question about something in the course, someone else does as well. Therefore, posting the question to the Q&A forum will allow the instructor to answer the question once for the entire class rather than several times through individual emails. Please post all such questions to the Q&A Forum, and please do not be offended if you email the instructor and you are requested to redirect the question to the Q&A Forum. The instructor will try to address any question posted to the forum within 24 hours, but also students are encouraged to answer questions from their peers if they have the answer. That will dramatically help get everyone in the course get the information they need. The Q&A forum is an official communication channel for the course.

Of course, questions regarding individual grades or personal issues should still be sent to the instructor individually by email.

Grading Summary

Final grades for this course will be calculated out of 1,000 total points in the following categories:

Item	Points
Midterm Exam 1	200
Midterm Exam 2	200
Final Exam	200
Lecture Quizzes	100
Lab Tasks	100
Lab Assignments	200

Exams: Exams will primarily cover the lecture material and any assigned text. Therefore exams are primarily concerned with GIS theory. Just because something was not mentioned in the lectures does not mean it is not eligible to be a test question – being in the assigned reading is enough. Likewise, just because something was not in the reading does not disqualify it from being on the test if it was discussed in class. These exams are NOT cumulative. Each is only concerned with the material taught since the previous exam.

Lecture Quizzes: Five quizzes will be given throughout the semester. These quizzes will be given online during different weeks of the course and will predominately cover GIS theory. These quizzes are not cumulative and will only cover material since the last quiz or exam. Each quiz will be for 25 points. 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. *These quizzes are individual assignments.* They **are** open book and open notes, however, 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.

Lab Assignments: Five major laboratory assignments will be turned in for a grade. Each of these assignments is worth 40 points. These laboratory assignments will focus on the technical aspects of using software to answer a geographic question and/or create a cartographic product.

Lab Tasks: Lab tasks are simply based on completion of tasks from the laboratory manual assigned for every week. At the beginning of the lab sessions the Teaching Assistant (TA) will specify which tasks to be completed within the lab hours. By the end of the lab session you will show your completed task 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).

In-class Quiz (Extra Credit): In addition to the above mentioned assignments, exams, and quizzes, there will be some in-class quizzes during the lecture sessions. These quizzes are for extra credit and add on top of the total score (1000) for this course.

Grading Scale

Point Total	Letter Grade
970-1000	A+
940-969	A
900-939	A-
870-899	B+
840-869	B
800-839	B-
770-799	C+
740-739	C
700-739	C-
670-699	D+
640-669	D
600-693	D-
Less than or equal to 599	F

At the discretion of the instructor, minor adjustments to this scale may be made based on the performance of the class as a whole at the end of the 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.

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.

It is very important for students to complete the assigned laboratory materials on time and in the sequence they are assigned. Laboratory assignments can be accepted up to one week late for a flat 10% late penalty for 48 hours after the deadline and 25% late penalty afterwards. Laboratories more than one week late will not be accepted.

Laboratory 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 the instructor if you are unsure about how to document sources. The instructor of this course may employ different methods of detecting plagiarism and other academic dishonesty, including the use of 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. The instructor also has the option to fail the student in the course. 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.

Please review the University’s academic dishonesty policies and procedures. They are all in force for this course. If you have any questions about where an activity might constitute academic misconduct, ask the instructor before you engage in the activity.

Classroom Conduct

Beyond the requirements of academic honesty, as a member of the learning community, each student has a responsibility to other members of the community. All students are expected to comport themselves in a dignified and professional manner. It is particularly important to this instructor that students treat one another with respect, which includes not taking part in any behavior which will disrupt the learning environment or inhibit other students’ ability to learn or fully participate in class. Please do not talk a while others are talking, while the lecture is ongoing (except for asking questions of course!), and if you finish an exam or other assignment before others, please find a way to keep yourself silently occupied while they finish.

When a cell phone rings in class, it is immediately disruptive to the class. Therefore, cell phones and other such communication devices should be turned off or put on silent (not simply vibrate), and ordinarily should not be taken out during class. Refrain from talking on the telephone, sending text messages, IMing using Facebook, Twitter, personal email, etc., while in class. Students may choose to use electronic methods for note taking, or use technology (such as Internet access) to find information relevant to the lecture or classroom discussion. Such technology usage is permissible.

Policy Regarding Recording Any Face to Face Interactions

This instructor believes that students may be discouraged from participation in class, especially in the discussion of potentially controversial material, if students are making recordings of the class proceedings. Therefore, students may make audio recording of the lecture materials only with the expressed permission of the instructor. Such 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 he 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. However, any students 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 is an official communication channel for information in this course. Not being present to receive such information is not a valid excuse for having the most updated information.

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Course Outline (Fall 2016)

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

Week	Lectures	Readings	Tutorial/lab
1	Monday: August 22, 2016 Introduction to Course and GIS Overview Wednesday: August 24, 2015 Basics of GIS Data and ArcGIS	PB Ch.1 - An Introduction to GIS	MA Ch.1 - Introducing GIS MA Ch. 2 - Introducing ArcGIS
2	Monday: August 29, 2016 Basic Geodesy Tuesday: August 31, 2016 Determining Position	PB Ch. 3 Section 1 - Introduction (pages 71 to 100)	MA Ch. 3 - Interacting with Maps MA Ch. 4 - Interacting with Data MA Ch. 5 - Exploring Online Resources (Optional)
3	Monday: September 5, 2016 <i>Labor Day (No Class)</i> Wednesday: September 7, 2016 Map Scale and Projections Quiz-1 due on Friday	PB Ch. 3 Section 2 - Map Projections and Coordinate Systems (pages 101 to 123)	MA Ch. 6 - Working with Coordinate Systems and Projections Lab-1
4	Monday: September 12, 2016 Basics of Mapping Wednesday: September 14, 2016 Choropleth Mapping	PB Ch. 4, Section 4, Subsection 1 - Cartography and Map Design BD Ch 7: The Choropleth Map	MA Ch. 7 - Symbolizing Features MA Ch. 8 - Classifying Features Lab-1 due on Friday
5	Monday: September 19, 2016 Midterm 1 Wednesday: September 21, 2016 The Vector Data Model and Geometric Representation	PB Ch. 2, Section 2 - Common Spatial Data Models PB Ch. 2, Section 3 - Vector Data Model	MA Ch. 9 - Labeling Features MA Ch. 10 - Making Maps for Presentation
6	Monday: September 26, 2016 The Vector Data Model and Attribute Information Wednesday: September 28, 2016 Table Joins and Spatial Joins Quiz-2 due on Friday	PB Ch. 8: Attribute Data and Tables	MA Ch. 15 - Querying Data MA Ch. 16 - Joining and Relating Data Lab-2

7	<p>Monday: October 3, 2016 Vector Data File Formats and GIS Data Sources</p> <p>Wednesday: October 5, 2016 Creating and Documenting Vector Datasets</p>	<p>PB Ch. 4, Section 1 - Building a GIS Database</p> <p>PB Ch. 4, Section 2 - Digitizing and Coordinate Capture</p>	<p>MA Ch. 12 - Creating Features MA Ch. 13 - Editing Features and Attributes</p> <p>Lab-2 due on Friday</p>
8	<p>Monday: October 10, 2016 The Core GIS Vector Toolkit and Selecting GIS Data</p> <p>Wednesday: October 12, 2016 Geoprocessing Tools-1</p> <p>Quiz-3 due on Friday</p>	<p>PB Ch. 9, Section 1 – Introduction</p> <p>PB Ch. 9, Section 2 - Selection and Classification</p> <p>PB Ch. 9, Section 3- Dissolve</p>	<p>MA Ch. 17 - Selecting Features by Location MA Ch. 18 - Preparing Data for Analysis</p>
9	<p>Monday: October 17, 2016 Geoprocessing Tools-2</p> <p>Wednesday: October 19, 2016 Geospatial Problem Solving</p>	<p>PB Ch. 9, Section 4- Proximity Functions and Buffering</p> <p>PB Ch. 9, Section 5- Overlay</p>	<p>MA Ch. 19 - Analyzing Spatial Data</p>
10	<p>Monday: October 24, 2015 Midterm 2</p> <p>Wednesday: October 26, 2015 Geocoding</p>		<p>MA Ch. 14 - Geocoding Addresses</p> <p>Lab-3</p>
11	<p>Monday: October 31, 2016 Network Analysis</p> <p>Wednesday: November 2, 2016 ACSP Conference (No Lecture)</p>	<p>PB Ch. 9, Section 6 - Network Analysis</p>	<p>ESRI Network Analyst Tutorial</p> <p>Lab-3 due on Friday</p>
12	<p>Monday: November 7, 2016 The Raster Data Model</p> <p>Wednesday: November 9, 2016 Raster Processing</p> <p>Quiz-4 due on Friday</p>	<p>PB Ch. 2, Section 3 - Raster Data Model</p> <p>PB Ch. 9, Section 5, Subsection 1 - Raster Overlay</p> <p>PB Ch. 10 - Topics in Raster Analysis</p>	<p>Tutorials on course website</p> <p>Lab-4</p>
13	<p>Monday: November 14, 2016 Steps of GIS Problem Solving and Change Detection</p> <p>Wednesday: November 16, 2016 The Global Positioning System</p>	<p>PB Ch. 5 - Global Navigation Satellite Systems and Coordinate Surveying</p>	<p>Field Data Collection Using ArcGIS</p> <p>Lab-4 due on Friday</p>
14	<p>Thanksgiving Break</p>		

15	<p>Monday: November 28, 2016 The Basics of Remote Sensing</p> <p>Wednesday: November 30, 2016 3D GIS</p> <p>Quiz-5 due on Friday</p>		<p>ESRI course: 3D Visualization Technique Using ArcGIS</p> <p>Lab-5</p>
16	<p>Monday: December 5, 2016 Big Data and CyberGIS</p> <p>Wednesday: December 7, 2016 Course Wrap-up</p>		<p>Viewshed Analysis and Visualization in CyberGIS Gateway</p> <p>Lab-5 due on Wednesday</p>
	Final Exam	<p>Wednesday: December 14, 2016, 1:30pm (Tentative) Location: TBD</p>	