

## UP 418

## GIS for Planners

Lecture: Tuesday 9:30 am – 10:50 pm, 225 Temple Buell Hall (TBH)

Lab sections: Thursday 9:30 am – 10:50 am, 11:00 am – 12:20 pm, 227 TBH

Course webpage: [compass.illinois.edu](http://compass.illinois.edu)

Instructor: Troy Mix (troymix1@illinois.edu)

Office hours: Monday 3:00 – 5:00 pm or by appointment, 301 Noble Hall

Mailbox: Department of Urban and Regional Planning Office, 111 TBH

Teaching assistant: Damyun Kim (dkim152@illinois.edu)

Office hours: Wednesday 10:30 am – 1:30 pm, 227 TBH

### Course Description

This course will provide students with an introduction to Geographic Information Systems (GIS). It is primarily intended for students in urban and regional planning. Over the course of the semester, the course will cover four interrelated areas:

1. Use of ESRI ArcGIS 10 software with spatial data
2. Basic concepts of cartography and the presentation of spatial data
3. Basic concepts in the analysis of spatial data
4. Practical applications of GIS for urban and regional planners

The course is designed to teach a mix of practical skills and fundamental concepts that planners should understand if they intend to use GIS in their work. The first half of the course focuses on basic GIS skills, while the second half focuses on using GIS for analysis.

### Course Format

The course consists of lecture and lab sessions each week. Students are required to attend the lecture and respective lab session each week. The lectures will focus on important concepts in GIS. The labs will focus on developing practical skills. Learning to use ESRI ArcGIS software is a major part of this class. Because learning new software takes time, students are expected to spend several hours each week (outside of assignments and lab sessions) working with ArcGIS in order to become proficient users.

### Texts

The texts for this course are listed below. *GIS Tutorial 1: Basic Workbook* and *GIS Tutorial 2: Spatial Analysis Workbook* are designed for use with ArcGIS version 10. These workbooks provide the data and instructions needed to complete the self-tutorial assignments. Readings will be assigned from the other two required books in order to further illustrate important GIS concepts covered in lectures. Assigned readings should be completed prior to attending lecture for the week they are listed. The books are available in campus bookstores and from online booksellers. Be sure to purchase the correct editions.

The books are abbreviated in the syllabus as follows:

- GT-1** Gorr, W. L., & Kurland, K. S. (2011). *GIS Tutorial 1: basic workbook*. Redlands, CA: ESRI Press.
- GT-2** Allen, D. W. (2011). *GIS Tutorial 2: spatial analysis workbook*. Redlands, CA: ESRI Press.
- EGGA-1** Mitchell, A. (1999). *The ESRI guide to GIS analysis: geographic patterns & relationships* (Vol. 1). Redlands, CA: ESRI.
- EGGA-2** Mitchell, A. (2005). *The ESRI guide to GIS analysis: spatial measurements & statistics* (Vol. 2). Redlands, CA: ESRI.

### **Software**

This course uses ESRI's ArcGIS 10 software. Computers in the Urban Planning computer lab (227 TBH) have ArcGIS 10 installed on them. TBH and the room 227 computer lab are available to you at all times when classes are not scheduled, though you will need your student ID to unlock the doors at night and on weekends (swipe your card at the western door to TBH). After-hours access should be automatic with enrollment in UP418, although for non-DURP students access may not be authorized early in the semester. Please inform me if you are not able to access the building or lab. You can review the computer lab class schedule at [urban.illinois.edu/courses/buell\\_sched.pdf](http://urban.illinois.edu/courses/buell_sched.pdf).

Other campus labs with ArcGIS 10 include the ACES Academic Computing Facility (<http://acf.aces.illinois.edu/>) and the ATLAS Open Computer Lab (<http://www.atlas.illinois.edu/services/rooms/labs/>) in the Foreign Languages Building.

For those wishing to install ArcGIS on their personal computers, version 10 is available for free through the University's Webstore: [webstore.illinois.edu](http://webstore.illinois.edu). You can also download ESRI-provided spatial data through the Webstore. This data should be particularly useful for final projects.

### **Course Compass Site**

The course website is hosted on Compass. You can access the site by going to [compass.illinois.edu](http://compass.illinois.edu), clicking "Log in to Illinois Compass", and logging in with your UIUC NetID and AD password. If you are not sure what your AD password is, refer to this site: [www.cites.illinois.edu/accounts/index.html](http://www.cites.illinois.edu/accounts/index.html). The Compass site contains the syllabus, course handouts, and any necessary data for assignments. You will use Compass to upload your weekly self-tutorials and other assignments throughout the semester.

## Assignments

### Weekly self-tutorials

Weekly self-tutorials are generally due the Monday following the week they are assigned. For example, tutorials listed under the week of January 16 will be due by Monday, January 23. Specific due dates are listed in the class schedule section of the syllabus. These assignments will be submitted electronically on the course's Compass site and are due by 10 pm on the due date. Submissions must be compressed ZIP files including the files outlined in the "Tutorial Submission Requirements" handout posted on Compass. ZIP file submissions should be named with your last name, followed by your first name and the week number of the assignment (as listed in this syllabus). For example, my submission for week 1 would be titled "MixTroy1.ZIP".

### Exercises

Three times throughout the semester, the weekly self-tutorial will be accompanied by a longer exercise. These exercises will be provided at lecture and are due a week and a half later on Friday. Hard copies of exercises 1 and 2 must be in my mailbox by 4 pm to be considered on time. These assignments will require color printing, which is available through the School of Architecture. Exercise 3 will be submitted using Compass. The dates for each exercise are as follows:

	<u>Provided</u>	<u>Due</u>
Exercise 1	Jan. 24	Feb. 3
Exercise 2	Feb. 14	Feb. 24
Exercise 3	Apr. 3	Apr. 13

### Midterm exam

The midterm exam will take place in class the week of March 5. Part one, given in the lecture session, will be a traditional written exam aimed primarily at testing mastery of GIS concepts. Part two, given in lab, will be an applied exam to test your ability to use the software and employ cartographic techniques. A study guide will be provided and class time will be devoted to review.

### Final project

The final project will be a self-designed project using GIS. This project is due by 4:30 pm on Wednesday, May 9 in my mailbox. Generally, you will prepare a paper describing what you did, how you did it, and what you learned about your chosen topic. The paper must be at least 4 but no more than 6 pages long with 1.5 line spacing, 12-point size Times New Roman font, and 1" margins on all sides. Any needed maps and figures should be included at the end of the paper and do not count toward the page total.

Students are required to turn in a brief project proposal (roughly one-half page) during lecture on April 3. I will provide comments on your proposal by April 12, and that day's lab session will be devoted to final project discussions. More details on the final project and proposal assignment will be included in a separate handout.

**Grading****Weekly self-tutorials and final project proposal**

Submissions will be graded “Satisfactory,” “Unsatisfactory,” or “No Credit.” All students should be able to earn “Satisfactory” scores, which signify full-credit and indicate carefully completed assignments with no major omissions and few major errors. “Unsatisfactory” marks represent ½-credit, and are awarded when significant parts of the assignment are incomplete, there are several major errors, or the assignment is late by any amount of time less than 72 hours. “No Credit” is given for assignments that are not turned in or are turned in 72 hours or more after the due date. Additionally, assignments submitted late that are of “unsatisfactory” quality will receive “No Credit.” Submitting the incorrect tutorial will also result in a grade of “No Credit,” so make sure to review the tutorial submission requirements carefully. Grades will be posted on Compass within two weeks of tutorial due dates.

**Exercises, midterm exam, and final project**

These assignments will be graded with a point value. The number of possible points will also be reported so that an approximate letter grade can be calculated for these assignments.

**Late work**

The late work policy for the self-tutorials and final project proposal is outlined above. For all other assignments, work turned in less than 24 hours late will automatically lose one quarter of the possible point value. Assignments will lose another quarter of the possible points for each successive day late. The only acceptable excuse for late work is an absence letter from the Emergency Dean ([www.odos.uiuc.edu/emergency/](http://www.odos.uiuc.edu/emergency/)).

**Attendance**

Attendance is mandatory in both lecture and lab. Beginning with the class after the add/drop period (January 31), attendance will be tracked using a sign-in sheet distributed during lecture and lab. Total absences will be reported on Compass. It is your responsibility to make sure that you sign the attendance sheet. You are allotted a total of 4 unexcused absences during the semester (to be used for lecture or lab). For these absences, you do not need to inform the instructor of the reasons for your absence. Any additional absences will lower your grade by one level (i.e., from a B+ to a B) for each absence, unless you provide an absence letter from the Emergency Dean.

**Final grade**

Final letter grades (A+ to F) will be awarded based on class attendance and the following weighting of graded assignments:

Weekly self-tutorials and final project proposal (14)	30%
Exercises (3)	30%
Midterm exam	20%
Final project	20%

**Working Together**

Working together is encouraged. You will gain important insights from reviewing each other's work and discussing problems you encounter in learning GIS. However, each student must complete assignments without relying on another student to actually complete the work. For example, it is acceptable to ask a classmate how to format a certain data set. It is not acceptable for your classmate to format the data for you.

**Classroom Decorum**

Class will start promptly at the scheduled time. Students not in attendance at the beginning of class will miss portions of the lecture or lab and disturb the class upon entering. Do yourselves and your classmates a favor—do not be late for class. Cell phones should be turned off.

**Professionalism in the Department of Urban and Regional Planning**

The Department of Urban and Regional Planning (DURP) is committed to creating an environment of inclusion and opportunity that is rooted in the responsibility of practicing planners to adhere to the highest standards of professionalism and integrity while serving the public interest. DURP expects all students to meet the goals outlined in the American Institute of Certified Planners (AICP) Code of Ethics and Professional Conduct for planners ([www.planning.org/ethics](http://www.planning.org/ethics)).

**University Student Code**

The University of Illinois Student Code applies to all conduct in this class ([admin.illinois.edu/policy/code](http://admin.illinois.edu/policy/code)).

**Class Schedule****Part 1 – Basic GIS Skills****Week 1 – January 16**

Lecture: Introducing the course and GIS

Lab: Basic ArcGIS functions

Self-tutorial: GT-1 chapters 1 and 2 – complete assignments 1-1, 1-2, 2-1, and 2-2 (due 1/23)

**Week 2 – January 23**

Lecture: GIS data structure

Lab: Querying, selecting, joining, and calculating data

Self-tutorial: GT-1 chapter 3 – complete assignments 3-1 and 3-2 (due 1/30)

*Exercise 1 provided in lecture*

**Week 3 – January 30**

Lecture: Basics of map design

Lab: Basic map design

Self-tutorial: GT-1 chapter 4 – complete assignments 4-1 and 4-2 (due 2/6)

*Exercise 1 due Friday, February 3 by 4 pm in my mailbox*

Week 4 – February 6

Lecture: Scale, coordinate systems, and projections

Lab: Defining projections, projecting data, and calculating area

Self-tutorial: GT-1 chapter 5 – complete assignments 5-1 and 5-2 (due 2/13)

Week 5 – February 13

Lecture: Editing spatial data and digitizing

Lab: Editing spatial data and digitizing – Tutorial assignments 6-1 and 6-2

Self-tutorial: GT-1 chapter 6 – complete assignments 6-1 and 6-2 (due 2/20)

*Exercise 2 provided in lecture*

Week 6 – February 20

Lecture: Geocoding and US Census spatial and attribute data

Lab: Address locators and geocoding

Self-tutorial: GT-1 chapter 7 – complete assignment 7-2 (due 2/27)

*Exercise 2 due Friday, February 24 by 4 pm in my mailbox*

Week 7 – February 27

Lecture: Spatial data processing and midterm review

Lab: Midterm review and basic spatial data processing – Tutorial assignments 8-1 and 8-2

Self-tutorial: GT-1 chapter 8 – complete assignments 8-1 and 8-2 (due 3/5)

Week 8 – March 5

Midterm exam in Tuesday lecture and Thursday lab

**Part 2 – Analysis using GIS**Week 9 – March 12

Lecture: Classifying and symbolizing data

Lab: Mapping quantitative data I

Self-tutorial: GT-2 chapters 1 and 2 – complete exercises 2-2 and 2-3 (due 3/26)

Reading: EGGA-1 pages 10-67

Week 10 – March 19

*No Class – Spring Recess*

Week 11 – March 26

Lecture: Mapping change and density

Lab: Mapping change

Self-tutorial: GT-2 chapters 3 and 4 – complete exercises 3-2 and 3-3 (due 4/2)

Reading: EGGA-1 pages 70-113

*Final project proposal due in lecture (4/3)*

Week 12 – April 2

Lecture: Measuring distances using vector data

Lab: Using network analyst

Self-tutorial: GT-2 chapter 5 – complete exercises 5-3, 5-4, 5-8, 5-9 (due 4/9)

Reading: EGGA-1 pages 115-147

*Exercise 3 provided in lecture*

Week 13 – April 9

Lecture: Distance with raster data / cost surfaces

Lab: Final project meetings and work on tutorial exercises

Self-tutorial: GT-2 chapters 6 and 7 – complete exercises 5-6, 5-7, 7-1, and 7-2 (due 4/19)

Reading: EGGA-1 pages 150-173, EGGA-2 pages 1-61

*Exercise 3 due Friday, April 13 by 4 pm on Compass*

Week 14 – April 16

Lecture: Finding, using, and sharing GIS data online

Lab: Using online data

Self-tutorial: Submit week 14 lab results (due 4/23)

Week 15 – April 23

Lecture: Descriptive spatial statistics

Lab: Spatial statistics and raster analysis

Self-tutorial: GT-2 chapters 8 and 9 – complete exercises 8-1, 8-4, 9-1, and 9-2 (due 5/2)

Reading: EGGA-2 pages 63-145

Week 16 – April 30

Lecture: Inferential spatial statistics; Course evaluations

Reading: EGGA-2 pp. 147-227

**Final project due Wednesday, May 9 at 4:30 pm in my mailbox**