# COURSE SYLLABUS: Computer Applications: GIS (PLAN544)

| Credits: | 3 |
| Location: | Higgins Hall North 208 |
| Time: | Wednesdays, 8 - 9:50 pm |
| Type of Course: | Lecture/Lab (Elective) |
| Enrollment Capacity: | 15 |
| Instructor: | Steven Romalewski |
| Phone: | 212-817-2033 |
| Email: | sr218 at hotmail dot com |
| Office Hours: | Hour before class (generally in HHN 208); other times by appointment |
| Lab tutor: | Hans Yoo (hansyoo3 at gmail dot com) |
| Lab hours: | TBD |

**Course Description**

Computer mapping has changed the way urban planners visualize data, enabling them to make decisions based on new ways of seeing and understanding patterns and trends. Creating effective maps and analyzing data spatially requires a level of expertise in cartography, geography, computer graphics, relational databases, and advanced analytical techniques. Off-the-shelf mapping software (as well as online applications such as Google Maps) can be deceptively easy, sometimes resulting in maps and analysis poorly suited to the needs of planners. With the right information and skills, you can avoid these pitfalls and successfully integrate mapping and spatial analysis into your coursework and your urban planning career.

This course provides an introduction to geographic information systems (GIS) for urban planners – teaching you the basic skills, techniques, and interpretive capabilities to make effective maps, analyze data within an urban planning context, and understand the pros and cons of different GIS techniques, databases, and software applications.

**Goals/Learning Objectives**

The course is designed to:
- expose you to the concepts behind organizing and analyzing data spatially using GIS;
- teach you skills and techniques to develop meaningful, effective maps and create and analyze spatial patterns;
- provide you with the insights to effectively interpret GIS-generated maps and the results of GIS-derived spatial analysis;
- emphasize the larger urban planning context in which an effective GIS can be used; and
- connect your GIS skills and tools to planning concepts and theories, with an emphasis on New York-area issues and data.

We will primarily use GIS software from Environmental Systems Research Institute (ESRI), but will also present other options such as “mashups” using the increasingly popular Google, Yahoo, and Microsoft online platforms, as well as open source applications.

**Outcomes**

PLAN544 will teach you skills such as:
- computer cartography;
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- using GIS’s spatial analysis tools to query databases and manage relational databases;
- identifying appropriate data sources via the Internet and offline;
- understanding GIS metadata (e.g., a data set’s spatial precision, currency/vintage, format, spatial extent, and projection/coordinate system); and
- presentation skills related to maps and GIS data.

Course Requirements
PLAN544 is a recommended elective for students in Pratt Institute’s Graduate Center for Planning and the Environment (GCPE) program. It is also available to undergraduate students. The course involves the following prerequisites, readings, and attendance/participation:

Prerequisites: Basic computer skills are essential. Each student must be familiar with the Microsoft Windows computer environment such as how to manage files, access network resources, and manipulate software.

(Note to Mac users: The computers in Pratt’s lab run on Windows, and ArcGIS is a Windows-based program. Workarounds are available if you have a laptop or home computer with the Mac OS, but you’ll be working in a Windows environment in the lab.)

Each student must also be familiar with Internet search and data access tools. Some experience with spreadsheet software (eg., Excel) and/or database formats (such as dbf or ASCII delimited files) is required, and more advanced experience is preferred. Introductory-level planning knowledge is helpful.


-- OR --


Reader: The readings listed in the weekly schedule below will be available as a package soon after the first class. To the extent that readings are available online or in electronic format, I will provide you with links to these sources. Make sure to regularly check the course website for links to helpful resources.

Recommended readings


Academic Integrity: Academic integrity is expected of every Pratt Institute student in all academic undertakings. Integrity entails a firm adherence to a set of values (outlined in the Academic Integrity Code in the latest Pratt Student Handbook), and the values most essential to an academic community are grounded in the concept of honesty with respect to the intellectual pursuits of oneself and others. A Pratt student’s submission of work for academic credit indicates that the work is the student’s own. In addition, Pratt students have a right to expect academic
integrity from their peers. Unless explicitly stated otherwise by the instructor, there are no group projects. If I allow outside assistance, this assistance must be acknowledged and the student’s academic position truthfully reported at all times.

Class Attendance and Participation: Class attendance will be taken regularly and will factor into your final grade. Students are expected to arrive at class on time – preferably you should be here a few minutes early to log on to the computer network. Lateness will cost points toward your grade. Success in completing your assignments, exams, and projects will depend on more than the readings – participation in class lectures, discussions, and hands-on experience with data and software are essential.

There are some circumstances, however, which may prevent you from attending class. Students must contact me ahead of time if you know in advance it will be impossible for you to attend a class. If weather causes delay or cancellation of academic activities, excused absences from class will be granted only if Pratt Institute officially closes – if the campus is open, I will be here and I expect that you will too.

If you do miss class, it is your responsibility to find out what you missed. Reach out to your fellow students who might be willing to provide you with assignments and notes.

Methods of Assessment
Each student will be evaluated based on the completion of:

- three homework assignments 30% of overall grade [10% for each assignment]
- mid-term exam 25% “ “
- final project 35% “ “
- regular attendance and participation 10% “ “

I may require additional assignments during the course to help familiarize you with GIS software and data sets. These will be ungraded, but will count towards the participation part of your grade.

Other Important Information
Office Hours: I will be available in the Higgins Hall North computer lab (room 208) each Wednesday before class (generally from 7:00 to 8:00 PM). If you need to speak with me at another time, please contact me for an appointment.

GIS lab: This semester we have scheduled dedicated GIS lab hours so you can work on projects, improve your skills, and work with a lab tutor for help with the software, GIS concepts, data, etc. Lab hours and location are TBD. The lab is not a requirement, but is intended as an opportunity for you to focus on hands-on exercises and learning GIS concepts on your own. The lab tutor is Hans Yoo, a GCPE student who excelled in the PLAN544 class.

Students with disabilities: In compliance with Pratt Institute policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Request for academic accommodations need to be made during the first two weeks of the semester, except for unusual circumstances, so that appropriate arrangements can be made. Students must register with Coordinator of Student Disability Services (SDS) (see: http://www.pratt.edu/disabilityservices/ or call 718-636-3711) for disability verification and for determination of reasonable academic accommodation.
Weekly Schedule and Readings
(unless noted otherwise, readings must be completed before the class to which they are assigned)

Week 1 (Wednesday, Jan. 21) – Overview of course
Topic(s)
• Thinking and analyzing spatially; GIS and urban planning applications
• Overview of GIS software options
• ArcGIS basics

Readings Due – these can be done before Week 2
• Getting to Know ArcGIS Desktop (GTKAG) Chapters 1, 2, and 3
  ➢ The exercises in GTKAG are optional, but can help you understand the concepts and software tools addressed in class
  ➢ Reader (GIS for the Social Sciences: Ch. 1; GIS for the Urban Environment: Ch.1 through page 19)

Exercise: Hand-draw a map of your neighborhood. Details handed out in class. This is not for a grade.

Week 2 (Wednesday, Jan. 28) – Data basics; geography vs. attributes; metadata; data sources
Topic(s)
• Review hand-drawn maps
• File/data management in GIS; vector vs. raster; metadata; geography review (projections, coordinate systems, scale, generalization)
• NYC data (a template for accessing/analyzing GIS data here and elsewhere)

Readings Due
• GTKAG Ch. 4
• Reader (ESRI Guide to GIS Analysis, Vol. I: pp. 11-19; GIS for Social Sciences: Ch. 2; GIS: A Short Introduction: Ch. 3 through p. 75)

Assignment: HOMEWORK #1 HANDED OUT – DUE WEEK 4
Exercise: begin to identify data sources (online or off) for your hand-drawn maps, as if you were going to remake the map using a GIS.

Week 3 (Wednesday, Feb. 4) – Data classification; thematic maps
Topic(s)
• Data classification; normalization; reclassifying
• NYC Council District demographics as an example (data access and thematic mapping)

Readings Due
• GTKAG Chapters 5 & 6 (through p. 157)
Week 4 (Wednesday, Feb. 11) – Cartographic techniques I

Topic(s)
- Color schemes vs. B&W/grayscale; graduated symbols; symbolizing types of features

Readings Due
- *GTKAG* Ch. 6 (pp. 158-170)

Assignments:
- HOMEWORK # 1 DUE
- HOMEWORK #2 HANDED OUT – DUE WEEK 6
  Exercise: TBD.

Week 5 (Wednesday, Feb. 18) – Linking and querying attributes

Topic(s)
- Review of Assignment #1
- Linking attribute data to geography; extracting data from the map

Readings Due
- *GTKAG* Ch. 8-10

Week 6 (Wednesday, Feb. 25) – Spatial queries: hands-on example

Topic(s)
- Identifying social services within Census tracts that meet certain socio-economic criteria

Readings Due
- *GTKAG* Ch. 12

Assignment: HOMEWORK #2 DUE
Exercise: TBD.

Week 7 (Wednesday, Mar. 4) – Cartographic techniques II

- Review of Assignment #2
- Review for Midterm
- “Marginalia”; map elements; layouts; labeling; annotation; managing layers

Readings Due
- *GTKAG* Ch. 7 & Ch. 19
- APA website re: standard land use color schemes ([www.planning.org/lbcs/standards/colorcodes.htm](http://www.planning.org/lbcs/standards/colorcodes.htm))

Week 8 (Wednesday, Mar. 11) – MIDTERM EXAM
Wednesday, Mar. 18 – NO CLASS – SPRING BREAK

Week 9 (Wednesday, Mar. 25) – Making maps: hands-on example

Topic(s)
- Midterm review
- Applying basic GIS map-making and querying concepts to NYC: mapping Lower Manhattan

Readings Due
- GTKAG Ch. 7 & Ch. 19
- Reader (GIS for the Social Sciences: pp. 142-146; How to Lie with Maps: Ch. 3; Geographic Information Systems and Science: pp. 146-152; GIS for the Urban Environment: pp. 34-38)

Exercise: TBD.

Week 10 (Wednesday, Apr. 1) – Cartographic techniques III; ongoing hands-on map making

Topic(s)
- Review of other representation techniques (charts, dot density, multivariate thematic maps)
- Review of map layouts, labeling, color schemes

Readings Due
- Review of readings from Weeks 3, 4, 6, and 9

Assignments:
- Final project assignments handed out
- HOMEWORK #3 HANDED OUT; DUE WEEK 12

Week 11 (Wednesday, Apr. 8) – Geocoding; issues with spatial units of analysis

Topic(s)
- Process of geocoding; how different software packages do it; how it’s applied to different data sets (e.g., centerline, tax parcel, ZIP Code centroid)
- Generalization; ecological fallacy/modifiable areal unit problem (MAUP); site selection vs. site planning; data suitability

Readings Due
- GTKAG Ch. 17
- Reader (Wikipedia “Geocoding” article pp. 1-3; ArcGIS 9/Geocoding in ArcGIS: pp. 1-9, 12-22, and 28-39; article from “Planning, Practice & Research”)

Week 12 (Wednesday, Apr. 15) – Advanced GIS tools; emerging GIS options

Topic(s)
- New mapping tools for planners (and others): a discussion of online apps such as Google Maps; 3D tools such as SketchUp integrated with online maps; Google Earth; Microsoft and Yahoo mapping systems; more traditional online systems such as OASIS NYC; and open source GIS options
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- Review of advanced ESRI tools such as spatial statistics; modeling; 3D GIS
- Basics of ArcToolbox and drawing/editing tools
- Add-ons for ArcMap – see PLAN544 website for links

Readings Due
- Visit the websites listed in the “Online Maps” section of the PLAN544 homepage and try the mapping tools that each site offers

Assignment: HOMEWORK #3 DUE

Week 13 (Wednesday, Apr. 22) – Presentation issues
Topic(s)
- Review of Assignment #3
- How to make your maps look good for others; pitfalls to avoid; what you see isn't always what you get (from the desktop to PowerPoint to the printed page); printing/plotting issues; different print media; graphics formats
- Tufte and maps
- Initial review and Q&A for final projects

Readings Due
- Reader (see Krygier “Making Maps” website)

Week 14 (Wednesday, Apr. 29) – Final project review
Topic(s)
- Review and Q&A for final projects

Readings Due
- Familiarize yourself with the “Handouts, additional readings and resources” section and the “GIS Resources” links at the PLAN544 Spring 09 website

Week 15 (Wednesday, May 6) – FINAL PROJECTS DUE; in-class exam.