COURSE SYLLABUS: Computer Applications: GIS (PLAN544)

Credits: **3**

Location:	**Higgins Hall North 306A**	***Time:***	**Monday 6-8 PM & 8-10PM**
Type of Course:	**Lecture/Lab (Elective)**	***Enrollment Capacity:***	**15**
Instructor:	**Steven Romalewski**	***Tel:***	**212-817-2033**
Email:	**sromalew@pratt.edu**		***http://pratt.edu/~sromalew/Fall06***
Office Location:	**Higgins Hall North 406**	***Office Hours:***	**Monday 5-6 PM**
Mailbox Location:	**Higgins Hall North 106**		

Lab tutor: **Jonathan Carey (**jonnycarey@gmail.com**)**
Lab hours: **Sunday 6-8 PM**

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 (including 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 the 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 for planning purposes 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 Environmental Systems Research Institute (ESRI) GIS software, but will also present other software options such as MapInfo, online web services, and open source applications.

Outcomes

PLAN544 will teach you skills such as:

- computer cartography;
- 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, ability to be georeferenced, currency/vintage, proprietary format, spatial extent, and projection/coordinate system); and
- presentation skills related to maps and GIS data.

Course Requirements

PLAN544 is a recommended elective for Pratt Institute Graduate Center for Planning and the Environment students. It is also available to undergraduate students. The course involves the following prerequisites, readings, and attendance/participation:

Prerequisites: **Basic computer skills are essential** – including familiarity with Internet search and data access tools. Some experience with spreadsheet software (such as 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.

Required text: *Getting to Know ArcGIS Desktop (Basics of ArcView, ArcEditor, and ArcInfo), Second Edition, Updated for ArcGIS 9.* Ormsby, T., et al. 2004, ESRI Press. ISBN: 158948083X (**Make sure you purchase the 2nd Edition. Also make certain the back pocket contains both CD-ROMs.**)

Reader: The readings listed in the weekly schedule below will be available either as a package before the first class, or on a weekly basis before each class. To the extent that reading material is available online or in electronic format, students will be provided with links to these sources. Make sure to regularly check the course website (http://pratt.edu/~sromalew/Fall06). It also provides links to helpful resources.

Recommended readings

1) *The ESRI Guide to GIS Analysis, Volume 1, Geographic Patterns and Relationships.* Mitchell, Andy. 1999, ESRI Press. ISBN: 1879102064
2) PolicyLink's "Equitable Development Toolkit: Community Mapping." Online at http://www.policylink.org/EDTK/Mapping/ **Provides a contextual background for how GIS is used in local planning, revitalization, and community building strategies.**

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 the instructor allows outside assistance (including assistance from a classmate, roommate, friend or family member), 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 lab 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. Weather is unpredictable and may cause delay or cancellation of academic activities. In these cases, excused absences from class will be granted only if the 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. You should reach out to your fellow students who might be willing to provide you with assignments and notes if you miss class.

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 20% " "
- final project 30% " "
- regular attendance and participation 20% " "

Other Important Information

Office Hours: I will be available either in the computer lab (Higgins Hall North 306A) or HHN 406 each Monday before class (from 5:00 to 6:00 PM). **These office hours apply to both sections of the course.** 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. We anticipate the lab hours to be scheduled Sunday nights from 6-8pm, location TBD. The lab tutor is Jonathan Carey, a GCPE student who excelled in the PLAN544 class and has been using GIS on the job. The lab is intended for you to focus on hands-on exercises, while the Monday night class will be more of a lecture format.

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 (Monday, Aug. 28) – Overview of course

Topic(s)

- Thinking and analyzing spatially; GIS and urban planning applications; software options
- ArcGIS basics

Readings Due *(can be done after the class if either the text or the reader are not available beforehand)*

- *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
- *PLAN544 Reader* (*GIS for the Social Sciences:* Ch. 1)

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

MONDAY, SEPT. 4 – NO CLASS – LABOR DAY HOLIDAY

Week 2 (Monday, Sept. 11) – Data basics; geography vs. attributes; metadata; data sources

Topic(s)

- Review freehand 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
- *PLAN544 Reader* (*ESRI Guide to GIS Analysis, Vol. I:* pp. 11-19; *GIS for Social Sciences:* Ch. 2)

Assignment #1: HOMEWORK #1 HANDED OUT – DUE WEEK 4, SEPT. 25

Week 3 (Monday, Sept. 18) – Mapping magnitude and intensity

Topic(s)

- Data classification; normalization; reclassifying
- NYC example (data access and thematic mapping)

Readings Due

- *GTKAG* Chapters 5 & 6 (through p. 157)
- *PLAN544 Reader* (*ESRI Guide to GIS Analysis, Vol. I:* pp. 37-55 & 70-85)

Week 4 (Monday, Sept. 25) – Cartographic techniques I

Topic(s)

- Color schemes vs. B&W/grayscale; graduated symbols; dot density; symbolizing types of features

Readings Due
- *GTKAG* Ch. 6 (pp. 158-170)
- *PLAN544 Reader* (*ESRI Guide to GIS Analysis, Vol. I:* pp. 26-34 & 56-62; *How to Lie with Maps:* pp. 18-24 & pp. 163-173)

Assignment: HOMEWORK # 1 DUE

Week 5 (Monday, Oct. 2) – Spatial queries I

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

Readings Due
- *GTKAG* Ch. 8-10

Assignment #2: HOMEWORK #2 HANDED OUT – DUE WEEK 7, OCT. 16

Week 6 (Monday, Oct. 9) – Issues of scale

Topic(s)
- Generalization; ecological fallacy/modifiable areal unit problem (MAUP); site selection vs. site planning; data suitability
- Census data; land use data; national and local sources; analyzing patterns; ArcGIS field calculator
- Online mapping examples; how they handle issues of scale

Readings Due
- *PLAN544 Reader* (*GIS for the Social Sciences:* pp. 142-146; *How to Lie with Maps:* Ch. 3; *Geographic Information Systems and Science:* pp. 146-152)

Week 7 (Monday, Oct. 16) – Spatial queries II

Topic(s)
- More on techniques such as point-in-polygon; overlays; buffers (including how to find and use ESRI's Buffer Wizard)

Readings Due
- *PLAN544 Reader* (*Geographic Information Systems and Science:* pp. 320-332)
- *GTKAG* Ch. 12 (and review of Ch. 10)

Assignment: HOMEWORK # 2 DUE

Week 8 (Monday, Oct. 23) – MIDTERM EXAM

Week 9 (Monday, Oct. 30) – Geocoding

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)

- Applications: district matching (point in polygon); proximity; aggregating; density analysis

Readings Due
- *GTKAG* Ch. 17
- *PLAN544 Reader* (Wikipedia "Geocoding" article pp. 1-3; *ArcGIS 9/Geocoding in ArcGIS*: pp. 1-9, 12-22, and 28-39)

Week 10 (Monday, Nov. 6) – Geocoding review and Cartographic techniques II

Topic(s)
- Geocoding review; online options
- "Marginalia"; map elements; layouts; labeling; annotation; ArcGIS layers

Readings Due
- *GTKAG* Ch. 7 & Ch. 19
- *PLAN544 Reader* (*Using ArcMap* pp. 59-64 & 453-455; *Geographic Information Systems and Science:* pp. 264-299)
- ColorBrewer [www.colorbrewer.org]
- APA website re: standard land use color schemes

Assignments:
- Final project assignments handed out
- HOMEWORK #3 HANDED OUT; DUE WEEK 12, NOV. 20

Week 11 (Monday, Nov. 13) – Cartographic techniques III

Topic(s)
- Symbolizing lines and points
- Review of other representation techniques (charts, dot density, combining multiple approaches)
- Review of map layouts, labeling, color schemes
- GIS Day – November 15, 2006

Readings Due
- Review of readings from Weeks 3, 4, 6, and 10

Week 12 (Monday, Nov. 20) – GUEST LECTURER (TBA): 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
- Review of advanced ESRI tools such as spatial statistics; modeling; 3D GIS
- Exposure to ArcToolbox and drawing/editing tools

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 (Monday, Nov. 27) – Presentation issues

Topic(s)

- 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
- Initial review and Q&A for final projects

Readings Due

- *PLAN544 Reader* (*Designing Better Maps:* Ch. 1)

Week 14 (Monday, Dec. 4) – GIS: Just one tool in a planner's toolkit; resources for future work

Topic(s)

- Displaying, sorting, graphing in Excel / Access / Word; other graphics applications
- Resources for future GIS work: GISMO / NYC; NYS GIS Data Sharing Cooperative; GIS networks in other cities/states; industry journals; GIS-focused blogs
- 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 Fall 06 website

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Week 15 (Monday, Dec. 11) – FINAL PROJECTS: presentation, review