New York University
Robert F. Wagner Graduate School of Public Service

URPL –GP 4648 Geographic Information Systems in Urban Planning I,
Mondays, September 10, 17, 24, and October 1, 8, 15 and 22.

Location: LC 19 at Tisch Hall, 40 West 4th Street; Time 4:55pm to 6:35pm.

COURSE SYLLABUS

Professor Zvia Segal Naphtali
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Course Description

In Geographic Information Systems in Urban Planning I, students will learn to apply spatial reasoning to real world problems in a variety of areas of application. These include urban planning, transportation, housing and neighborhood planning, environment, hazard and emergency management, public health, crime, and more.

In a variety of class exercises, students will also learn how to organize and manage geospatial data, visualize spatial patterns, conduct basic spatial queries, and more. Students will learn to prepare datasets for mapping with ArcGIS 10, currently the most popular Geographic Information Systems (GIS) software. They will also be introduced to the recent developments in ArcGIS Online, to cloud-based mapping solutions, to ArcGIS applications for smartphones and tablets, and to a variety of websites dedicated to GIS applications online, and more. Time permitting, students may also be introduced to the uses of GIS in analyzing climate change, natural hazard monitoring, or disease tracking. These topics will be covered in the Advanced GIS course in the Spring of 2013.

In the course of the seven days of this course, students will work on a series of GIS exercises and case studies that will introduce them to the key applications and techniques of ArcMap. The focus will be on learning data management and database design techniques that are unique to GIS. Students will be introduced to the basic techniques of manipulating, querying and displaying spatial data.

In the first four classes, students will be introduced to working with the software, ArcMap 10 and learn to prepare some basic maps using both quantitative and qualitative data. They will learn to design effective and professional looking maps using color shading, graduated symbols and dot density, and to prepare professional map layouts. They will also learn to embed their maps in written reports, in PowerPoints, and to save their work in Map Packages.
The subsequent three classes will be devoted to a number of topics starting with mapping land use data. Students will learn to group land use categories using ArcMap’s QueryBuilder. Also covered will be mapping census data and learning to import Excel data and prepare it for use in ArcMap. Time permitting, the last class will introduce students to geocoding crime and other data and to buffering points, lines and polygons.

The geographic data that students will be analyzing and mapping will come from a variety of sources and will be focused on data for NYC. Students will also learn to map data for the New York Metropolitan Tri-State area. Time permitting, they will be introduced to mapping USA and international data, topics that will be covered in the GIS II class and in the Spring 2013 Advanced GIS class. The focus throughout this GIS I class will be on learning to obtain and manage spatial data, to prepare it for mapping and on preparing professional looking maps. Students will learn to search for GIS data on various websites and to prepare the data for use in ArcMap. They will also learn to locate, manage and prepare the GIS data for analysis on their own.

The main objective of this GIS I course is to introduce students to spatial reasoning and to problem solving strategies as well as providing them with hands-on mapping skills using the ArcGIS software. Using a variety of real-world examples in class exercises, in a number of homework assignments, and in a Final Project, students will gain a deeper understanding of the various applications of GIS.

It is expected that after completing this GIS I class, students will be able to make use of some of the newly acquired mapping skills in other courses, and in Capstone projects at Wagner. They will also be prepared to apply the new mapping skills in their current work outside Wagner, and in their future public service professional careers.

Course requirements

Students are required to complete three homework assignments and a small Final Project of their own choosing. They are required to submit a preliminary proposal for their Final Project on the fifth day of class (October 8). Also required is reading the assigned chapters and case studies in books on reserve and articles that will be available on Blackboard (see page 3).

The Final Project paper and maps and the Report on the Reading are due on the last day of class (October 22). NOTE: All assignments must be completed on time.

Grading

Your grade in this class will be based on the following: (1) Class participation and attendance (10% of the grade); (2) Three Homework Assignments (30% of the grade), (3) A Final Project Report with at least six full size color printed maps, a printed Final Paper (in color), and a PowerPoint (40% of the grade); (4) A Report on the Reading (20% of the grade).
The Reading Requirements:

Students should start reading immediately after the first class and come prepared to discuss their progress on the reading during the first ten minutes of each class. The final Report on the Reading is due on the last day of class (October 22).

Recommended • Juliana Maantay & John Ziegler, *GIS for the Urban Environment* Chapters 1, 3 and 6. Chapter 1 – “Basics of Mapping and GIS” and Chapter 3 on “Thematic Mapping” are the best chapters in the book. Chapter 6 covers “Sources of Urban Data.” Most important and required is the reading of **THREE** Case Studies of your choice in this book. **This book is out of print.** The NYU Bookstore and Amazon may have copies if you wish to buy the book. **Students are not required to buy the book.** There are **four copies** of the book are available on reserve at the Bobst Library (two of them are my personal copies).

Other recommended readings are from a book by Ormsby, et. al., *Getting to Know ArcGIS* for ArcGIS 10, the 3rd Edition (ESRI Press, 2010). Chapters will be assigned.


Class Schedule

In the **first four classes**, students will be introduced to working with **ArcMap 10**, currently the leading Geographic Information Systems (GIS) software packages for mapping.

In the **first** class, students will explore the **ArcMap and ArcCatalog** interfaces and tools. They will learn about the special features and capabilities of **ArcMap 10** including labeling features (e.g. streets), using the variety of tools available in **ArcMap**, how to find features on their maps, how to measure distances between features, how to zoom and pan their maps, and much more.

The hands on class exercises will also involve evaluating two **Map Packages (mpk)**. Note that saving your work in a **Map Package (mpk)** greatly facilitates sharing map documents with others and is also helpful when moving one’s work from one computer to another.

**HOMEWORK #1:** The homework involves examining maps on various websites which are listed in **APPENDIX #1: WHAT IS GIS?** and **APPENDIX #2: ICIS MAPS**. These two Homework documents are available on Blackboard. The deliverables for these homework assignments are two PowerPoint presentations, each including a title page, at least **six** screen captures of maps. Also required are two MS. Word documents in which
students will briefly discuss (in one or two pages) what they learned from inspecting the maps on various websites listed in these two Appendices.

The second class will begin with a ten minutes discussion and two brief presentations on what students learned completing HOMEWORK #1: APPENDIX #1: WHAT IS GIS? and APPENDIX #2: ICIS MAPS. Students are required to place printed copies (in color) of the two HOMEWORK POWERPOINTS, and the written MS. Word comments, in their class folders. They are also required to save all their work on their USBs. One of these USBs will be collected at the end of this class.

Following the discussions and two presentations of HOMEWORK #1 in the second class, students will begin working on two hands-on exercises involving two more Map Packages (mpks). These Map Packages were also prepared by students in former GIS I classes. One of the mpks involves Mapping Health Care Expenditures, and the second Mapping Asthma in the South Bronx.

The main focus of the second class is to teach students to prepare their own maps and to save them as Map Packages (mpks), a task that will be continued in the rest of this class. [The instructions on how to save Map Packages (mpks) are also available on Blackboard. See APPENDIX #3 – SAVING LOGOS AND MAP PACKAGES.]

The third class will be devoted almost entirely to learning about all aspects of thematic mapping, and how to prepare professional looking maps with a layout, a title, a legend, north arrow, logo, scale, etc. Students will also learn to prepare a bivariate map of Median Household Income and in the Bronx and the location of Toxic Release Inventory Sites (TRI) and of Waste Transfer Stations. They will learn to prepare other bivariate maps by adding other layers and mapping Asthma data and the location of hospitals in the Bronx. Students are required to save all their final maps as a Map Packages (mpks).

The fourth class will introduce students to sources for GIS data and maps. Guest presentations will include an introduction to NYU’s GIS Services and Spatial Data Resources by a staff member. Another presentation will focus on the GIS data available at the NYU Furman Center for Real Estate and Urban Policy and will be led by a former student in this GIS I class. Other invited guest presentations on October 8 (the fifth class) may include the chief geographer from the NYC office of the Census Bureau and/or a former student of this GIS class. On the last day of class, a guest presenter from ESRI in NYC will be invited to introduce this class to sources of data on the Internet and to ArcGIS online and more.

HOMEWORK #2: This homework assignment will follow the fourth class. Students will explore the various sources for GIS data for mapping on the web and report on what they learned. A guide to selected data and maps on various websites is available on Blackboard in APPENDIX #4: WHERE DO I FIND GIS DATA AND MAPS.
(2) The 5\textsuperscript{th} and 6\textsuperscript{th} and 7\textsuperscript{th} classes -- October 8, 15 and 22.

These classes will focus mapping Land Use, Crime, and Health Data.

In the fifth class students will be introduced to mapping land use data (using recent MapPluto files) for the South Bronx. They will map areas with open space, industrial, manufacturing and commercial land uses. They will also map public facilities and institutions. In these exercises, students will learn advanced GIS skills and mapping techniques such as “grouping” categories of land use using ArcMap’s QueryBuilder.

HOMEWORK #3 will follow the 5\textsuperscript{th} class and will be due on the 6\textsuperscript{th} class. A brief description is available below.

The sixth class will introduce students to some advanced DATA MANAGEMENT techniques in ArcMap. They will complete a long exercise on Mapping Data for the Tri-State Area using data from The American Community Survey. They will work with Travel to Work data such as the percent of workers that took public transportation, that drove to work alone, the percent that carpooled, percent that worked at home, and the percent that used other means of transportation (walking, etc.). Students will learn to prepare and import Excel files from The American Community Survey into ArcMap. They will learn to “Join” the transportation data to ArcGIS maps and more.

The seventh class will begin with two (or more) presentations of Final Projects and a brief discussion of the reading that students completed for this class. Students will be introduced to mapping crime and health data and to data management techniques such as “select by attributes” and “select by location.” Students will also learn to define more complex logical conditions for selections from datasets. Time permitting, in the second part of this class students will be introduced to “geocoding” which is the process of converting addresses to specific points on a map. They will also be introduced to the NYC LION street file and learn to use an Address Locator to geocode addresses of, say, hospitals in NYC. [These topics will be covered in great detail in the GIS II class.]

HOMEWORK #3: To be assigned at the end of the 5\textsuperscript{th} class

The third Homework Assignment will build on, and extend, what students learned so far.

It will include a number of small exercises mapping land use in the South Bronx, symbolizing Census 2000 (and 2010) data on population, income and poverty extending what they learned in this class. Students will also map crime data for the Bronx, for Manhattan, northern Brooklyn and Queens. Students are required to submit all their work in Map Packages (mpks), and pdfs. They will prepare PowerPoints, and also to embed their maps in a Word document in which they will discuss the challenges they faced, and report on what they learned completing this assignment. HOMEWORK #3 maps should be saved as Map Packages, as pdfs, and in a PowerPoint. The work should be printed in color and saved on the USB to be submitted to Professor Naphtali.
A REPORT ON READING 20% of your grade (at least 4 pages long)
Sample reports on reading will be available on Blackboard. Deadline: Last day of class.

THREE HOMEWORK ASSIGNMENTS 30% of your grade
The class handouts will provide details about the homework assignments. The homework assignments must be saved as Map Packages (mpks) on the USBs. You must also submit printed maps in color, pdfs, a PowerPoint, and a written report in Word (with embedded maps) in which you describe your experience completing the work.

FINAL PROJECTS - 50% of your grade. Six pages of text plus six attached maps. Students can make use of the data provided in class in creative ways. Alternatively, they can download the data they need for their Final Project papers from the internet. They can also obtain data from projects they are working on in their jobs or in their Capstone projects. Details about the requirements of the Final Project will be discussed in class and will be available in writing. Examples from previous years will be available on Blackboard. Preliminary Proposals for the Final Project papers must be submitted on the 5th day of class (Oct. 8). All work must be submitted on a USB.

The Final Project: What should be submitted?
A printed report (six or more pages) with embedded maps in color. The report should include a full discussion of the project and its findings and also offer some references to literature on the subject. Also required are full-page printed color maps and a printed PowerPoint in color (one map per page is preferred). In addition, students should submit a USB on which they will save all the mpks, the pdfs, the PowerPoint and the written report. Note: the USBs will be returned to the students’ mailboxes at the Puck Building within two weeks after class ends.

Please buy two 4GB USBs (flash drives) and bring them to the first class.

It is anticipated that by the end of this GIS I course, students will have good working knowledge of mapping with ArcGIS 10. They should also be prepared to take the intermediate GIS course URPL–GP 4649 Geographic Information Systems in Urban Planning II. GIS II is offered immediately after this GIS I course by Professor Naphtali. Completing URPL–GP 4649 GIS II course is a prerequisite to enrolling in the Advanced GIS course which will be offered in the Spring of 2013.