Columbia University – Spring 2014
GIS for Preservation (A6414)
202 Fayerweather – Wednesdays 6pm to 8pm
Instructor: Jennifer Most (jlm2053@columbia.edu)
TA: Emily Barr (eeb2144@columbia.edu)

INTRODUCTION

A geographic information system (GIS) is a tool that integrates computer software and data in order to view, manage and analyze information about geographic places. GIS maps are quickly understood and easily shared, allowing us to view, interpret and visualize data in ways that reveal relationships, patterns and trends. GIS has become an important instrument in numerous fields, including urban planning, engineering, public health, and environmental science. Within the field of historic preservation, it has become a central instrument for telling the stories of cities, towns and regions, and for managing historic resources. In this class we will learn the basics of the popular GIS mapping program ArcMap, with a specific emphasis on how to apply those skills to the practice of historic preservation.

CLASS STRUCTURE

This course will meet once a week for two hours. The majority of each class will be dedicated to instruction of GIS by means of hands-on in-class exercises led by the instructor. There will also be lectures and discussions of reading assignments throughout the semester as they relate to each week's lesson.

ASSIGNMENTS

In-class lessons will be reinforced by weekly at-home assignments. There will also be short written assignment throughout the semester. Additionally, there will be a take-home midterm examination as well as a final project (presentation and paper).

TEXTBOOKS & READINGS

Textbooks: There are no required textbooks for this course. There will be weekly handouts to accompany each lesson. The information in these handouts are largely derived from these three sources:

- *GIS Tutorial 1: Basic Workbook for ArcGIS 10* (Wilpen L. Gorr and Kristen S. Kurland, 2011)
- *Getting to Know ArcGIS Desktop, Second Edition, Updated for ArcGIS 10* (Tim Orms, Eileen J. Napoleon, Robert Burke, Carolyn Groessl, and Laura Bowden, 2010)
- *The GIS 20: Essential Skills* (Gina Clemmer, 2010).

All three books are available at Avery Library for your reference.

Readings: Readings for this class are required and are mostly from the following books:

- *Past Time, Past Place: GIS for History* (Anne Kelly Knowles, 2002)
- *GIS for the Urban Environment* (Juliana Maantay and John Ziegler, 2006)

Readings will be made available through Courseworks. The books are also available at Avery Library.

Note: If you decide to purchase any of these books, inexpensive copies are often available online on sites such as *Half.com.*

EXTERNAL HARD DRIVE OR FLASH DRIVE

It is *required* that everyone get an **external hard drive** or **flash drive** for use in this class. The external hard drive or flash drive will be used for copying data from the class drive and will enable you to work seamlessly on any computer that runs ArcMap. If you already have an external hard drive or flash drive that you would like to use, I recommend a **minimum of a 40 GB** of free space. *The external hard drive or thumb drive must be brought with you to every class, starting on day one (January 22nd).*

GRADING:
45% - Weekly Assignments
(28% - Weekly GIS exercises (total of 7 assignments worth 4pts each))
(12% - Weekly written exercises (total of 6 worth 2pts each))
(5% - Group project (total of 1 worth 5pts))
15% - Midterm Exam
10% - Class participation (attendance; discussions; demonstrated knowledge of readings and concepts)
30% - Final Project
(Project proposal draft – 2pts)
(Final project proposal – 3pts)
(Final presentation – 10pts)
(Final paper – 15pts)

Weekly Assignments
Weekly assignments will consist of exercises that reinforce each week's topic. As directed, completed assignments should be posted to Courseworks and printed in color by the day the assignment is due (typically the following class). There may also be written questions to answer or other deliverables. *Pay attention to each week's handout to make sure you hand in all required deliverables. Points will be deducted for lateness and incomplete assignments, depending on the severity.*

Midterm Exam
The midterm exam will be a take-home exam which tests your understanding of the lessons and techniques learned in the first half of the semester. *Pay careful attention to lectures and readings throughout the semester to ensure you are prepared!*

Final Project
The final project will consist of a research question, preferably relating to historic preservation practice, that you have answered utilizing ArcMap. Final presentations will be divided into two sessions. Printed copies of all presentations must be handed in by the earlier session in order to ensure fairness to all. Final papers are due May 7th, 2014 for everyone.

GETTING HELP

Electronic Data Services (EDS): EDS, located in the basement of Lehman Library, is a great resource for GIS data and technical questions. EDS collects GIS data and might have data you need for your final project. EDS also has technical consultants available in the afternoon for questions regarding the acquisition of data as well as the technical questions related to performing certain GIS operations.

ESRI User Forums: There are two ESRI websites that are great resources for technical GIS software questions - the old and new user forums: http://forums.esri.com/search.asp?c=93 (old forum) and http://forums.arcgis.com (new forum).

Computer Hardware, Network, or Software Problems: The instructor and TA are not equipped to assist with computer hardware, network, or software problems. If you are having any such trouble, it is strongly recommended that you reach out to the **GSAPP helpdesk** and open a helpdesk ticket. Opening a ticket is essential for tracking progress of your issue, and can be helpful documentation if something catastrophic happens to prevent you from completing an assignment on time. To open a ticket, go to: http://www.arch.columbia.edu/resources/help (it is the first link on the page).

Teaching Assistant and Office Hours: Both the instructor and TA will have office hours by appointment only. Keep in mind that the instructor will not be available between 8am and 6pm on weekdays, which means that responses to email questions may be slow. For this reason, I strongly encourage you to use the Courseworks discussion board (which both the instructor and TA will check periodically) and reach out to the class TA with questions that require a timely response.

****NOTE: THE BELOW WEEKLY SCHEDULE OF LECTURES, EXERCISES AND ASSIGNMENTS IS SUBJECT TO CHANGE****

WEEKLY SCHEDULE

Week 1

Wednesday, January 22th
Topic(s): Overview / Intro to GIS Mapping / Getting to Know ArcMap

In Class:

- Lecture: Introduction to GIS Mapping
- In-Class Exercise: Getting familiar with ArcMap

Reading(s):
1) Preface and Introduction – *Past Time, Past Place: GIS for History*
2) Chapter 4 – Telling Civil War Battlefield Stories with GIS – *Past Time, Past Place: GIS for History*

Assignment(s) (due next class):
1) On-Your-Own Exercise 1: Getting Familiar with ArcMap
2) Written Assignment 1: See handout (based on readings)

Week 2

Wednesday, January 29th
Topic(s): Map Design / Starting a New Map / Selecting Features and Querying Data / Working with Layouts / Advanced Labeling Techniques

In Class:

- Lecture: What makes a Well-Designed Map?
- In-Class Exercise: Starting a New Map, Selecting Features and Querying Data, Working with Layouts, and Advanced Labeling Techniques

Reading(s):
1) Chapter 7 – Causes of the Dustbowl – *Past Time, Past Place: GIS for History*
2) "Make Maps People Want to Look At," by Aileen Buckley for ArcUser (Winter 2012)

Assignment(s) (due next class):
1) On-Your-Own Exercise 2: Creating a New Map
2) Written Assignment 2: See handout (map design critique / reading critique)

Week 3

Wednesday, February 5th
Topic(s): Editing Vector Data (Points, Polygons and Lines)

In Class:

- Lecture: About Editing in GIS
- In-Class Exercise: Editing Vector Data (Points, Polygons & Lines)

Reading(s): NA

Assignment(s) (due next class):
1) On-Your-Own Exercise 3: Editing Vector Data
2) Written Exercise: NA

Week 4

Wednesday, February 12th

Topic(s): Map Projections / Working with Raster Images / Georeferencing Historic Maps

In Class:

- Lecture: About Projections / About Georeferencing
- In-Class Exercise: Work with Map Projections, Working with Raster Images, and Georeferencing Historic Maps

Reading(s):

1) Chapter 1 – Historical Maps in GIS – *Past Time, Past Place: GIS for History*

Assignment(s) (due next class):

1) On-Your-Own Exercise 4: Georeferencing Paper Maps
2) Written Exercise 3: See handout (based on in-class lecture/exercise and reading)

Week 5

Wednesday, February 19th

Topic(s): GIS and Historic Preservation / Thematic & Categorical Mapping

In Class:

- Lecture: Thematic & Categorical Mapping / Mapping for Historic Preservation
- In-Class Exercise: Defining Symbology in a Map

Reading(s):

1) TBD

Assignments (due next class):

1) On-Your-Own Exercise 5: Create a Choropleth Map with Graduated Symbol Overlay
2) Written Exercise 4: See handout (based on independent web research)

Week 6

Wednesday, February 26st

Topic(s): Data Methods & Statistics / File Geodatabases / ArcCatalog / Modifying Attribute Table Data / Joining and Editing Data / Working with Centroids

In Class:

- Lecture: About Data Classification / Review of Basic Statistics
- In-Class Exercise: Working with File Geodatabases, ArcCatalog Utilities, Modifying Attribute Table Data, Joining and Editing Data, Working with Centroids

Reading(s):

1) Chapter 5 – Immigration, Ethnicity, and Race in Metropolitan New York – *Past Time, Past Place: GIS for History*

Assignment(s) (due next class):

1) On-Your-Own Exercise 6: Joining and Mapping Data
2) Written Exercise 5: See handout (based on lecture/exercise and reading)

Week 7

Wednesday, March 5th

Topic(s): Finding and Assessing Public Data Sources / About Metadata / Prepping Excel Spreadsheets for Joining

In Class:

- Lecture: Finding and Assessing Public Data Sources
- In-Class Exercise: Editing Metadata, Downloading Data, Prepping an Excel Spreadsheet for Joining

Reading(s):

1) Chapter 9 – Mapping British Population History – *Past Time, Past Place: GIS for History*

Assignments (due next class):

1) On-Your-Own Exercise 7: Downloading and Joining U.S. Census Data
2) Written Exercise 6: See handout (based on reading and identification of public data sources)

***** Note: Come next week prepared with questions re: your final projects and the midterm.*****

Week 8

Wednesday, March 12th

Topic(s): Final Project and Midterm Discussion / Geoprocessing Techniques (Merging / Appending / Clipping / Dissolving / Intersections / Buffering / Spatial Joining)

In Class:

- Lecture: Final Project and Midterm Discussion
- In-Class Exercise: Geoprocessing Techniques (Merging, Appending, Clipping, Dissolving, Intersections, Buffering, and Spatial Joining)

Reading(s): NA

Assignments (note due dates below!):

1) Take-Home Midterm Exam: Consisting of a problem set with questions that will test your knowledge of the GIS concepts and techniques discussed during lectures and in-class exercises. Due next class (***6pm March 26th***).
2) Draft Final Project Proposal: Draft a final project proposal and email to me PRIOR TO NEXT CLASS (*no later than **8pm March 24th!**)* I will have feedback for you before the next class so that we can begin in-class discussions next week. The earlier you email me, the sooner I will be able to respond. **Late proposals will not be accepted.** *Proposals should be no more than one single-sided page and should describe the question you intend to answer using GIS and the methodology or sources you will use, including whether you will be creating your data or utilize existing data sets.*
3) Optional: Download a tracking app for your smartphone, such as **OpenPaths** or **Google Latitude**, and allow the program to run on your phone until the Week 10 class, at which point you will be able to use the data collected for an Extra Credit assignment (see Week 10, April 2nd).

(WEDNESDAY, MARCH 19TH – NO CLASS DUE TO SPRING BREAK)

****Note: Portions of next-week's class will take place outdoors. Dress appropriately.****

****Be prepared to discuss your final projects during the next class.****

Week 9

Wednesday, March 26th

Topic(s): Final Project Discussions / Applying GIS Techniques: Mapping Morningside Heights / Using Google Forms

In Class:

- Lecture: About the In-Class Assignment
- In-Class Exercise: ***Dress warmly*** - we will be going out in groups and performing a survey of buildings around Columbia's Morningside Heights campus.

Note: In case of inclement weather, we will be utilizing Google's Street View functionality to perform this exercise.

Reading(s): TBD

Assignments (due next class):

1) Group Project: Within your groups, complete today's in-class exercise. See handout.
2) Final Project Proposal: Refine your final project proposal based on feedback from your draft proposal and during in-class discussions. *Deliverable*: No more than one single-side page (printed).

Week 10

Wednesday, April 2nd

Topic(s): Web-based Multi-Media Mapping Guest Lecture / Web Mapping / KML

In Class:

- Guest Lecture: Web-based Multi-Media Mapping with Liz McEnaney
- In-Class Exercise: Basic web mapping techniques (Google)

Reading(s): TBD

Assignments (due next class):

1) *Extra Credit #1* (2 pts): See handout (based on lecture / in-class exercise).

Make sure you keep working on your final projects! Don't lose momentum!

****Be prepared to discuss your final projects again during the next class, particularly if you have questions for the instructor and TA. ****

Week 11

Wednesday, April 9th

Topic(s): GPS Devices / Digital Photos as GPS / Hyperlinked Maps / Dynamic Displays / Map Animations / Individual Discussions of Final Projects

In Class:

- Lecture: NA
- In-Class-Exercise: About GPS and Using Digital Photos as GPS, Hyperlinking in ArcMap, Dynamic Display Thresholds, and Animating Maps
- In-Class Final Project Discussions: Work on final projects in class / sign up to discuss final projects with instructor and TA

Reading(s): TBD

Assignments (due next class):

1) *Extra Credit #2* (2 pts): See handout (based on in-class exercise).

****Be prepared to discuss your final projects again during the next class, particularly if you have questions for the instructor and TA. ****

Week 12

Wednesday, April 16th

Topic(s): Three-dimensional GIS / Individual Discussions of Final Projects

In Class:

- Lecture: Final project presentation expectations
- In-Class Exercise: ArcGIS 3D Analyst
- In-Class Final Project Discussions: Work on final projects in class / sign up to discuss final projects with instructor and TA

Reading(s): NA

Assignments (due next class):

1) **FINAL PRESENTATIONS DUE NEXT WEEK FOR EVERYONE!** Please make sure to print in full-color (and staple!) your final presentations, to be handed in at the beginning of next class (regardless of which day you present). *Remember, all work presented much match what you handed in or points will be deducted.*

Week 13

Wednesday, April 23rd

Final Presentations, Round 1

Week 14

Wednesday, April 30th

Final Presentations, Round 2

******NOTE: ALL FINAL PAPERS – PRINTED IN COLOR AND STAPLED – DUE NEXT WEEK!******

FINAL PAPERS DUE

Wednesday, May 7th

Final Presentations, Round 2 (Location: TBD)