

## **LDA 198**

### **Foundations of Applied Geographic Information Systems:**

#### **GIS for Speculation and Design**

Summer Session 1, June 23-August 1

4 Credits

Tuesdays & Thursdays

12:10-6:00pm

Location: 253 Hunt Hall

Instructor: Xiaowei Wang (xiaowei.wang@post.harvard.edu)

#### **Course Description**

Map making is not a neutral act of representation; it is an act of design and speculation. In this course we will focus on tools and techniques in Geographic Information Systems (GIS) as a way to critically and strategically deploy mapping as a technique for shaping space rather than simply representing it. GIS emerged out of a joint research effort at Harvard and MIT in the 1960s – through digitization of spatial data, researchers envisioned a system of material/spatial data management that would compel rational regional planning (and war strategy) through computation: equal parts game theory and urban planning. Since its creation, GIS has become the tool for urban planners, city management and an emerging group of citizens and activists alike. Mapping has pervaded our world, in the power of geolocative services, the management of freight flows, and disaster readiness planning all the way to infographics that illuminate the materially embedded world we inhabit.

This six week course undertakes contemporary issues and techniques within digital geography (as opposed to simply digital mapmaking) to form a solid foundation for mapping as the core of spatial thinking. It emphasizes how mapping is tied to the management of the physical world, alongside the technical knowledge ranging from spatial data analysis to mapmaking for the web.

We will focus on building a solid foundation in operating ArcGIS as a tool for managing spatial data, alongside maps as a way of visual communication and critical thinking. We will also explore how maps are imbued with bias, power and the ways that data can shape certain design decisions.

#### **Course Objectives**

To build a solid foundation in ArcGIS and GIS more broadly as a technology through application and use. In order for students to also use other GIS software, as ArcGIS is not a universally used program (although it is the preferred program), we will spend time focusing on some core elements of GIS – from analytic tools to relational database management.

In applying GIS as a tool, we will go from simple data creation/gathering mechanisms such as surveys on the ground, data gathering using a cellphone to use and analysis on a site chosen by the student for the final project.

Finally, we will understand the elements of visual communication and representation using maps, the look of maps, legend design and simple color/map elements.

#### **Format**

The course will consist of lecture and hands on workshop sessions, with the bulk of time being spent in workshops. Step by step tutorials will be given along with their corresponding handouts.

In general the format of each 6 hour class will be: 1 hr group review of assignment (pinup)/1 hr lecture, with a half hour break and 3.5 hrs of tutorial/workshop time.

Readings are chosen to complement not duplicate lectures and workshops. I have scanned the textbook and it is intended as a reference guide.

## **Assignments and Grading**

Assessment overview:

Exercises (6 x 5%) = 25%

Comprehensive Lab Assignments (3 x 10%) = 30%

Final Project = 30% which is graded in components as follows

Project Proposal Paragraph = 5% of final project grade

Draft Presentation = 5% of final project grade

Presentation and poster = 20% of final project grade

Class blog entries (3 minimum) = 5%

Class participation = 5%

Exercise 1	5%	6/26
Exercise 2	5%	7/3
Exercise 3	5%	7/10
Exercise 4	5%	7/17
Exercise 5	5%	7/22
Exercise 6	5%	7/24
Comprehensive Lab 1	10%	7/1
Comprehensive Lab 2	10%	7/8
Comprehensive Lab 3	10%	7/15
Final Project	30%	Project proposal due 7/15, final presentation is 7/31
Class blog entries (3)	5%	6/30, 7/7, 7/21
Class participation	5%	

### **Exercises**

Exercises are short assignments between each workshop intended to review and build on the tutorials we went through during workshop. They are straightforward; if you are spending too long on them, you may be over-thinking the problem!

### **Comprehensive Lab Assignments**

Comprehensive Lab Assignments are longer and are "mini projects" where students will be required to use a variety of skills from previous workshops and lectures.

### **Class Blog**

We will have a shared class blog for everyone to post references, links and images to. The blog is intended to facilitate exchange of images during the week and encourage further discovery of maps, work, installations and projects related to mapping whether digital or analog.

### **Class Participation**

Class participation is key during the group review of assignments. Students will be expected to weigh in on each other's

work and provide helpful comments to each other. As the nature of the 6 week course is intensive, class participation should foster a vibrant community of safe intellectual exchange, sharing and dialogue surrounding mapping and cartography.

### **Final Project**

The final project will be based around a specific site, chosen by the student. The project should be focused on tackling a design problem on the site – whether a social issue using census data or environmental issue using vegetation/natural data. The initial project proposal will focus on a specific spatial research question that the student is interested in. This will be discussed further in class.

Examples of spatial research questions: In the Bay Area, there is a noticeable lack of transportation around extremely low-lying coastal areas. What is the correlation between topography, income levels and transportation ability in the Bay Area?

### **Attendance**

Attendance is extremely important given the short duration of the class. If, for some reason you need to miss a class, please let me know in advance and we can figure out a way to make up the class and topics covered.

### **Getting help**

You may email me at any time with questions on the material, technical questions or otherwise at: [xiaowei.wang@post.harvard.edu]. I will be available on campus Tuesday and Thursday mornings for additional questions. If Tuesday or Thursday mornings do not work, we can arrange for an alternative time.

### **Topics Covered and Schedule**

1: 6/24 and 6/26	<ol style="list-style-type: none"><li>1. Course introduction</li><li>2. History of GIS/basic GIS concepts</li><li>3. Data types, thematic map types</li><li>4. Projection systems, measurements</li><li>5. Adding and finding data</li></ol>	<ol style="list-style-type: none"><li>1. Vector and raster data</li><li>2. Attribute tables and relational databases</li><li>3. Classifications</li></ol> <p><b>Exercise 1 DUE</b></p>
2: 7/1 and 7/3	<ol style="list-style-type: none"><li>1. Data tools</li><li>2. Joining data</li><li>3. Creating data through drawing</li><li>4. GPS data, collecting</li></ol> <p><b>Comp. Lab 1 DUE</b></p>	<ol style="list-style-type: none"><li>1. Field surveying, adding data to map</li><li>2. Adding data to GIS from Google Earth/crowdsourced maps</li></ol> <p><b>Exercise 2 DUE</b></p>
3: 7/8 and 7/10	<ol style="list-style-type: none"><li>1. Geoprocessing, analytics and GIS</li><li>2. Geocoding, suitability analysis</li></ol>	<ol style="list-style-type: none"><li>1. Geoprocessing analytics and GIS pt 2</li></ol> <p><b>Exercise 3 DUE</b></p>

	<b>Comp. Lab 2 DUE</b>	
4: 7/15 and 7/17	<b>1.</b> Open Source GIS and webmapping pt 1. <b>Comp. Lab 3 DUE</b> <b>Project proposal DUE</b>	<b>1.</b> Open Source GIS and webmapping pt 2 including applications <b>Exercise 4 DUE</b>
5: 7/22 and 7/24 nb: I will hold extra office hours during the weekend of 7/26 for extra help on final projects	<b>1.</b> GIS modeling <b>2.</b> Other tools for GIS modeling and communication	Group crits for final project <b>Exercise 5 &amp; 6 DUE</b>
6: 7/29 and 7/31	Lecture on further applications Work on final project	Final project presentation