Quantitative Methods in Archaeology (116.569)
Syllabus—Fall 2012

Room 14-119
Thursdays 2:00-5:00pm

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Office Hours: Thursdays 10-12
Appointments welcome

This course will offer you a practical introduction to Geographic Information Systems (GIS) using ArcGIS software. There are many GIS programs available on the market, some of which are open-access and free, but ArcGIS is most widely used software that GIS analysts use. Each week, we will have a brief lecture on GIS theory and general principles, which will be followed by a lab practicum. The labs are very self-directed, but I will be available throughout the class period to help you finish your lab.

You will have a final project in the class in which you will use the skills you are developing in GIS to make a map that can be analyzed using basic analytical tools. You will use your own data to complete your final project, and so at the end of the class, you will have something you can use for your thesis.

There are two textbooks for the class, one of which is available in the SNU library, but I **strongly** advise you to purchase your own copy of it from an online retailer:

Gorr, Wilpen L. and Kristen S. Kurland
2011 *GIS Tutorial 1: Basic Workbook*. For ArcGIS 10 (4th edition). Redlands, California: ESRI Press. (ISBN 978-1-58948-259-3)

There is a companion DVD that comes with the textbook that is essential for you to complete your weekly assignments. There is another DVD that is a 180-day trial edition of ArcGIS, so if you want to install the program on your own laptop, you can do that for the duration of the class. When you order your book, be sure to get the DVDs.

The second book from which I will lecture (but not test you on) is:
Connolly, James and Mark Lake
2006 *Geographical Information Systems in Archaeology.* Cambridge: Cambridge University Press. (ISBN 978-0-521-79744-3)

It is a good reference manual for you to have and will help you with your final project. You will get more out of the class if you keep up with the readings and ask questions in class about them. Nothing is more boring than listening to a professor lecture out of a textbook.

Weekly assignments. Each week, you will need to complete two or three lab assignments that are in the back of each chapter of the textbook. There are 11 chapters. There are four computers in the GIS classroom, and you will use the same computer every week so that I can grade your assignments from those locations. Each assignment will be stored in a separate folder, and organized by the week and assignment. GIS requires that you be very organized with storing files, and I will not hunt through your computer every week to try to find where you buried your assignment. It needs to be in the same set of folders every week. Each assignment is due on the Tuesday following class at 9:00 am.

Final project. Your final project will be to construct a project from your own research materials that involves all of the following elements: (1) you must digitize a map of some sort, (2) you must make at least three different types of shapefiles (point, line and polygon), and (3) you must produce some sort of spatial analysis comparing features on a landscape (for example: buffer, predictive, kernel density, make a model of some sort). Finally, you must write a 4-5 page paper (**single space, text**) that discusses the purpose of your project, the process that you used to construct your GIS database, potential sources of errors, and what you hope to accomplish with this project (project goals).

Grading: Weekly assignments (25 assignments, 50%); Final project (50%)

Class outline:
Week 1 (September 6): Class Introduction.
- DISCUSSION: What is GIS?
- We will review the syllabus and ensure that everyone has access to the reading material for the class.
- Assignment: Gorr & Kurland (2011) Assignment 1-1 & 1-2 (DUE Sept 11, 9am)
- Read Conolly & Lake (2006) Ch. 1 & 2

Week 2 (September 13): Spatial Data and Cartography
- DISCUSSION: Logic and variables involved in making maps
- Assignment: Gorr & Kurland (2011) Assignment 2-1 & 2-2
- Read Conolly & Lake (2006) Ch. 3

Week 3 (September 20): GIS in Archaeology
- DISCUSSION: How and why do we use GIS?
- Assignment: Gorr & Kurland (2011) Assignment 3-1, 3-2 & 3-3
- Read Conolly & Lake (2006) Ch. 4

Week 4 (September 27): Geodatabases
- DISCUSSION: DBMS, hierarchy models, network models
- Assignment: Gorr & Kurland (2011) Assignment 4-1 & 4-2
- Read Conolly & Lake (2006) Ch. 5

Week 5 (October 4): Spatial Data Acquisition
- DISCUSSION: Primary data, secondary data, digitizing data
- Assignment: Gorr & Kurland (2011) Assignment 5-1 & 5-2
- Read Conolly & Lake (2006) Ch. 6

Week 6 (October 11): Surface Models
- DISCUSSION: Kriging, interpolation and making a DEM
- Assignment: Gorr & Kurland (2011) Assignment 6-1 & 6-2
- Read Conolly & Lake (2006) Ch. 7

Week 7 (October 18): Data Analysis
- DISCUSSION: Statistical analyses and data classification
- Assignment: Gorr & Kurland (2011) Assignment 7-1 & 7-2
- Read Conolly & Lake (2006) Ch. 8

Week 8 (October 25): NO CLASS (Reading day: feel free to come to the lab and read or do next week's assignment)

Week 9 (November 1): Spatial Analysis
- DISCUSSION: Regression, correlation, clusters, and predictive modeling
- Assignment: Gorr & Kurland (2011) Assignment 8-1, 8-2 & 8-3
- Read Conolly & Lake (2006) Ch. 9

Week 10 (November 8): Map Algebra, Surface Derivatives and Spatial Processes
- DISCUSSION: Point and spatial operations
- Assignment: Gorr & Kurland (2011) Assignment 9-1, 9-2 & 9-3
- Read Conolly & Lake (2006) Ch. 10

Week 11 (November 15): Regions: Territories, Catchments and Viewsheds
- DISCUSSION: What is a "region" and how do we use them in archaeology?
- Assignment: Gorr & Kurland (2011) Assignment 10-1 & 10-2
- Read Conolly & Lake (2006) Ch. 11

Week 12 (November 22): Routes: Networks, Cost Paths and Hydrology
- DISCUSSION: What is a "network" and how do we use them in archaeology?
- Assignment: Gorr & Kurland (2011) Assignment 11-1 & 11-2
- Read Conolly & Lake (2006) Ch. 12

Week 13 (November 29): Maps and Digital Cartography
- DISCUSSION: How to make a good map
- Assignment: Work on your final project. Have a map digitized and shapefiles made by December 4.
- Read Conolly & Lake (2006) Ch. 13

Week 14 (December 6): Maintaining Spatial Data
- DISCUSSION: Metastandards, metadata
- Assignment: Continue working on your final project. Have spatial analysis completed by December 11.

Week 15 (December 13): FINAL PROJECT DUE (paper + maps submitted to me as a pdf file and leave the digital versions on your computer).