# Lecture Notes, Module 1

**Geog 319/658** **Notes for first Class** **Fall 2014**

Welcome

Stress that this is both 319/658: the key difference as we will see is that those taking the course at the 658 level will be expected to develop a more substantial final project.

Team-taught

Talk a bit about Michael Peterson's visit and how we decided to team-teach this class.

- Mike Peterson, the author of the text for the course visited KU to present a colloquium in which he discussed material related to his book *Mapping in the Cloud*
- We (Xingong Li and I) discussed the book and decided it had potential for a team-taught course. My strength is in the mapping side, Xingong's strength is in the spatial analysis and programming side. I have also taught programming, but my experience was with Visual Basic.
- We are excited about the opportunity to try to combine our separate strengths.

We have also made an effort to strengthen our background for the course. I attended the Google Higher Ed Summit in late August and we both applied for and received CyberGIS Fellows and thus attended the CyberGIS conference, also in late August. As we go through the course, we will have occasion to mention these activities and associated tools that we learned about.

Meeting time

We meet 3-4:15 MW. There is no Lab with a TA; rather you will be developing programs, but not with a TA looking over your shoulder. By having both of us involved, however, we can provide more assistance outside class. [As it turned out, we dedicated about a half-dozen of the 75-minute lecture periods to time in the lab where students could ask us questions about their exercises.

Contacting us

You can contact us via email, but my experience is that programming issues often require some one-on-one interaction. We will be available at hours other than office hours. We also encourage you to help debug each other's code.

Course Description (see the section labeled "Course Description" in the syllabus)

- This course covers a broad range of methods for visualizing and analyzing spatial data (fits the title of the course)
- Loosely speaking, the terms cloud computing , web mapping , and CyberGIS cover similar areas
    - You are connected to the Internet and are likely taking advantage of data and resources located elsewhere.
    - Typically, the cloud has storage, visualization, and analysis advantages compared with traditional desktop/local system.

- Goal – develop your own web mapping and analysis applications
    - Example 1: Show Dustin Cable's racial dot map ( http://www.coopercenter.org/demographics/Racial-Dot-Map )
        - An attempt to visualize the racial and ethnic makeup of the more than 300 million people of the U.S. as of the 2010 census
        - Show the interactive map
        - Show the code that underlies the app
        - One of our motivations would be to have you be able to do something like this
            - Stress that this particular example may not be feasible because there is some pretty involved programming in this app; if you read the web link on Blackboard, you will see that it mentions Python, Java, and Google Maps API. Our focus in this class will be on Javascript and Google's API.
    - We presented a 6-minute lightning talk at the recent CyberGIS conference. After the talk, one of the other Fellows recommended that students in our course submit projects to the AAG Mashup Mapping Competition; I gave you a link for last year's competition; whether we can reach a level sufficient to compete well is questionable, but let's at least think about it.

## Learning outcomes

- KU likes us to be explicit about this.
- Use of programming languages
    - We need html because that is sometimes referred to as the “language of the Internet”; we need it as a wrapper. JavaScript is one language that can be used in association with html. Python is another. JavaScript is very popular and is used by our Peterson text. Those of you who know another language well may end up using that for your final project, which we will talk about in a bit.
- Use APIs
    - These are libraries of computer code that make the development of mapping and analysis applications much easier. Google Maps API is very popular and it is the one that Peterson focuses on. As you explore the Web and think about your final project, you may decide to use another API.
- Associated with 1 and 2, we want you to be able to create both mapping and analysis web apps.

## Students with Disabilities

If you have any disability that might prevent the full expression of your abilities, please talk to us privately.

## Academic Misconduct

Although copying another student’s code is inappropriate, we want you to interact with one another as you work on the exercises and final project. You don’t want to make exact copies of your friend’s code, but it is appropriate to debug each other’s code as that is a learning exercise. You also may find it helpful to converse with each other about the approaches that you are using to tackle an exercise or final project.

Moreover, you will find that people creating web applications often borrow each other’s code. If you use someone else’s code, be sure that you indicate what portions of your code were taken from somewhere else.

## Grading

- Summarize the components of grading
- [Initially, we had planned on having students complete 15 exercises, but the lack of programming background meant that we moved more slowly than originally planned and so we ended up having them do only 10 exercises.]
- Don’t panic on the in-class presentation. We will be happy to go over what you plan to present before you go into the classroom. Also presenting in front of a small group like this will be good experience because some day you may have to present for a larger audience. The more that you do this, hopefully it will become easier.

## Storage for Data and Maps

- Be sure to back things up
- We will create separate storage space for each of you on the G drive in room 310 so that you can easily move between computers
- We have brand new computers in 310; we’ll give you the specs once we have them
- In order to make your maps available to others, you need to place it on a web server
    - We will use a commercial web hosting service that Peterson recommends; it provides up to 1500 mb of free storage
    - [We also planned to use a web server located here at KU, but it turned out that we did not have time to work with this]

## Blackboard

- Note that we have combined 319 and 658 so that all material for these classes is in one location.
- Look under Websites to get various web links that we mention in class

## Required Text

- There is not a text that truly fits our conception of the course. We want to cover both mapping and analysis, but Peterson focuses on mapping

- Peterson makes the assumption that this book is for someone with little or no programming background. We, however, would like students to have at least some programming background. You will be able to develop more powerful applications with a stronger programming background. Don't panic though if you have a relatively limited background or a rusty one. As you will see in a moment, the Peterson book provides lots of code as a starting point and there are lots of sites on the Web that include code.
- The Peterson book alternates chapters of cartography/GIS material and coding approaches.
  This would be nice if this was truly an introductory course, but this is a bit more advanced course.
    - Stress that we will not lecture on all of the material. We will, however, ask you to read the bulk of the material. This will get everyone to the same level as some of you may not have had some of the more basic material.
    - For next time, read the Preface, Chapter 1, and Chapter 2

## Potential Textbooks

- We wanted you to be aware of other books that we considered for the course
    - Fu and Sun
        - This book focuses more on the structures and components of Web GIS. It has few mapping and analysis applications.
    - Muehlenhaus
        - This would be a very interesting book if this were a map design course
        - Some of you might use this as a reference for your final project when thinking about map design
    - Yang and Huang
        - This is a book of examples of using cloud computing to support earth system sciences research.

## Readings via reserve, electronicly via KU, and Blackboard

- Note what is already there and that we may add others.
- For Blackboard, we've created a category called Readings

## Topics to be Covered

- Note that exercises are spread throughout the topics…
- To get set for exercise #1, it makes sense to read the Preface, Chapter 1, and Chapter 2
- Looking through the list, you will see that we will be covering some other topics not covered in Peterson
    - Google Earth Engine API
        - Basically, 40 years of Landsat data is now available through Google Earth Engine and using the associated API we can analyze that data in a variety of ways
        - Google will let each of you apply for a license and then we'll illustrate how to work with the data
        - Xingong – show example of Global Forest Change ( http://earthenginepartners.appspot.com/science-2013-global-forest )
    - Experimenting with the Oculus VR headset
        - Xingong take the lead on briefly introducing this ( https://www.oculus.com/ )

## Students introduce themselves

- [It may make sense to do this late in the class so that you can get a better feel for how students might fit in with what you plan to cover (i.e., they've heard what you have to say)]
- Have each student give their name, major area of interest (e.g., major in geography with an interest in human geography), programming background, what they hope to get out of the class

## Possibly show some code and apps from Peterson's book

[We thought about doing this, but we didn't think it would be all that productive at this stage.]