

SSCI 301L – MAPS AND SPATIAL REASONING

Course: SSCI 301L – Maps and Spatial Reasoning

Sections: 35712R (Lecture); 35713R (Lab)

Lecture: Monday & Wednesday 2-3:20pm

Lab: Wednesday 12-1:50pm

Location: AHF (Allan Hancock Foundation) B57A

Website: www.blackboard.usc.edu

Instructor: Dr. Darren Ruddell

Office: AHF Building B57F

Email: druddell@usc.edu

Website: <http://spatial.usc.edu>

Skype: darren.ruddell

Twitter: @SSI_Prof

Office Hours: Tuesday and Thursday 11:30am-12:30pm and by appointment. I am happy to meet in person or asynchronously via email. I am also available via Skype or Adobe Connect most days provided we schedule the meeting in advance. Please take advantage of office hours – it is a great resource.

1. Introduction

Maps have long played a role in the production and use of geographic information. They support many different kinds and levels of spatial reasoning ranging from simple queries (route finding, proximity analysis) to more advanced forms of spatial analysis and modeling. There has been a recent explosion in geographic information (GI) technologies the past two decades which include quick visualization tools (Google, Bing Maps) to sophisticated GISystems (ArcGIS, Idrisi) and many kinds of GPS-enabled sensors. These tools have attracted large numbers of users: for example, social workers use GIS to track where clients live and where more social services are needed, planners use GIS to analyze the transformation of city spaces as urban areas develop, landscape architects use GIS to design and track the status of their individual project sites, anthropologists use GIS to map the changing cultural patterns of a neighborhood, historians use GIS to map historical transformation across space, environmental scientists use GIS to track how natural disasters and groundwater flows interact with human-environment systems, and emergency responders use GIS to track where earthquake or hurricane survivors need assistance.

Taken as a whole, this course provides a broad understanding (theoretical and technical) for later work with geographic information, regardless of background. It covers the geographic information technologies and spatial skills needed to map, model, and predict how physical and social phenomena develop and change. In these ways, the spatial sciences can significantly affect the way research is conducted, profoundly impact the way we understand the world, and help us to prepare plans and

designs that would dramatically improve the quality of life for those whose life experiences and prospects are shaped by spatial processes if implemented.

2. Course Objectives

Students who excel in SSCI 301L will be able to:

- Explain how and why organizations (i.e., public, private, and not-for-profits) produce and use geographic data, including topographic maps, remotely sensed imagery, and thematic maps to portray census and various types of community, social, and natural resource information;
- Explain how modern geographic analysis and visualization tools can be used to advance our knowledge and understanding of human and environmental activities and events from a variety of disciplinary perspectives;
- Describe the goals and contents of key geographic applications such as Bing maps, Google Earth, MapQuest, OpenStreetMap, and the U.S. National Map.

3. Course Organization

This is a four-credit course comprised of lectures (two per week) and lab (one per week). The lecture sessions will discuss various aspects of cartography, spatial reasoning, and the hardware and software systems to investigate these processes. The weekly lab meetings are designed to introduce you to the tools of scientific inquiry and to give you practical experience in implementing these tools to explore various problems within the framework of the scientific method. The lecture and lab sessions are designed to complement each other to provide you with sound theoretical reasoning and the technical skills to investigate various physical and/or social processes. Your weekly laboratory assignments will be graded and returned, and the mid-term and final exams will have a laboratory component to them. **It is required that you register for both the lecture and laboratory session for this course.**

Please note that all course materials and correspondence will be posted on the course Blackboard site. As a registered student you will find this course available for you to access at 10am Pacific Time on the first day of classes.

4. Course Assessment

In-class Assignments	10%	Laboratory Assignments	25%
Social Media Interactions	10%	Midterm Examination	20%
Laboratory Practical	15%	Final Project	20%

Please note that no make-up opportunities will be offered for missed tests or exams. If you have a known conflict, speak with me as soon as possible so we can make alternative arrangements.

5. Social Media – Twitter

The social media site Twitter has been gaining tremendous currency in the academic world as an instrument for sharing information, commenting on issues related to higher education, as well as addressing challenges in a given field, such as geospatial technologies. As such, it has achieved acclaim

for its use as a pedagogical tool to extend the work of the classroom. We are going to use Twitter in this course to complement assignments and activities, in addition to augmenting the analytical work of the class. Beyond its relevance to the coursework, though, you are encouraged to explore the site as to its possibilities for professional networking for yourselves. Make sure to follow me (@SSI_Prof), other members of the class, in addition to following leaders in your field.

Although we will sometimes use Twitter in the classroom, the bulk of your Twitter activity will take place outside of class. You will be required to tweet a minimum of 3 times per week (at least three tweets each week for weeks 1-15 of this course). There are a few simple guidelines for tweeting: 1) they must be relevant to the class (i.e., a response to a reading, a link to a related article, a map or image, a question, etc.); 2) they must be substantive; and 3) they must be respectful. In addition to reading your tweets on a regular basis, I will be using an online archiving tool to keep track of Twitter activity.

You must use the hashtag #SSCI301 to ensure that your tweets are incorporated into the class discussion. Any tweets that do not contain this hashtag will not be counted because the website will not record their activity.

Twitter activity for the course will be graded on a pass/fail basis. If you tweet the requisite number of times (a minimum of three tweets per week – or 3X15 = 45 total tweets), you will receive an A for this assignment. If not, then you will receive an F.

6. Textbooks

Required Texts:

Harder, C, Ormsby, T, and Balstrom T. (2013). *Understanding GIS: An ArcGIS Project Workbook, Second Edition*. California, Esri Press.

Harvey, F (2008) *A Primer of GIS: Fundamental Geographic and Cartographic Concepts*. New York, Guilford Press.

Monmonier, M (1996) *How to Lie with Maps* (Second Edition). Chicago, University of Chicago Press.

Related Texts:

Kimerling, A J, Buckley, A R, Muehrcke, P C, and Muehrcke, J O. (2010) *Map Use and Analysis* (Sixth Edition) Redlands, California: ESRI Press.

Campbell, J (2001) *Map Use and Analysis* (Fourth Edition). Boston: McGraw Hill.

Pearce, M and Dwyer, O (2009) *Exploring Human Geography with Maps* (Second Edition). New York: W H Freeman.

Letham, L and Letham, A (2008) *GPS Made Easy* (5th Edition). Seattle: Mountaineers Books.

Clark, K C (2010) *Getting Started with Geographic Information Systems* (Fifth Edition). Upper Saddle River, New Jersey: Pearson Education

Harmon, K (2003) *You are Here: Personal Geographies and Other Maps of the Imagination*. Princeton, New Jersey, Princeton University Press

Johnson, S (2007) *The Ghost Map: The Story of London's Most Terrifying Epidemic – and How It Changed Science, Cities, and the Modern World*. New York: Riverhead Trade.

7. Academic Accommodations

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP and it should be delivered to me early in the semester. DSP is located in STU 301 and is open from 8:30am to 5:00pm, Monday through Friday (213-740-0776; study@usc.edu).

8. Academic Integrity

Academic integrity is a foundational principle of our community and ensuring the highest standards of academic integrity is the collective responsibility of faculty, students, and administrators. There is a process in place to deal with such incidents as cheating, unauthorized collaboration and plagiarism. The Trojan Integrity Guide can be found at <http://www.usc.edu/student-affairs/SJACS/forms/tio.pdf> and the Undergraduate Guide for Avoiding Plagiarism can be found at <http://www.usc.edu/student-affairs/SJACS/forms/tig.pdf>.

9. Important Administrative Dates

- 8/25: Fall semester classes begin
- 9/1: Labor Day, university holiday
- 9/12: Last day to register and add classes, change enrollment option to Pass/No Pass or Audit, or to drop a class without a mark of "W" and receive a 100% refund
- 11/14: Last day to drop a class with a mark of "W"
- 11/26-29: Thanksgiving recess, university holiday
- 12/5: Fall semester classes end
- 12/6-9: Study days
- 12/17: Final examination (8-10:00am)

10. Course Outline

The course will be organized around the following four modules and the accompanying lecture and laboratory topics.

Module 1: Core Concepts

- 8/25: Introduction to Course
 - 8/27: Maps and Spatial Reasoning
- Read Harvey (Chapter 1, pp.3-33)*

- 9/1: University Holiday
 - 9/3: GTCM and Geographic Representation and Choices for Cartographic Representation
- Read Harvey (Chapter 2, pp. 34-52)*

Module 2: Map Principles

- 9/8: From a Round to a Flat Surface: Projections
 - 9/10: Additional Choices in Map Making
- Read Harvey (Chapter 3, pp. 53-72)*

9/15: Making Projections: Earth Models and Datums

9/17: Types of Projections and Their Characteristics

Read Harvey (Chapter 4, pp. 75-101)

9/22: Ruddell away – cartographic representation

9/24: Ruddell away – take-home assignment

Read Harvey (Chapter 5, pp. 102-126)

9/29: Projections throughout History

10/1: How to Set Locational and Coordinate Systems

Read Harvey (Chapter 6, pp. 127-138)

Module 3: Spatial Analysis and Reasoning

10/6: Databases

10/8: Geographic Information Systems

Read Harvey (Chapter 7, pp. 139-159)

10/13: Geographic Positioning Systems

10/15: GIS Day preparation

Read Harvey (Chapter 8, pp. 160-173)

10/20: Mid-term Exam

10/22: Conduct field work

Read Harvey (Chapter 9, pp. 174-189)

10/27: Map Types

10/29: Guest Lecture: Andy Rutkowski

Read Harvey (Chapter 10, pp. 193-220)

11/3: Remote Sensing

11/5: Remote Sensing in Practice

Read Monmonier (whole book) plus Harvey (Chapter 11, pp. 221-250)

11/10: Government Mapping Agencies and the Administration of Spaces

11/12: Crowd Sourcing and Volunteered Geographic Information

Read Harvey (Chapter 12, pp. 253-250)

11/17: Geographic Information and Spatial Analysis; Examples of Spatial Analysis

11/19: GIS Day

Read Harvey (Chapter 13, pp. 253-270)

11/24: Geostatistics

11/26: Thanksgiving Holiday

Read Harvey (Chapter 14, pp. 271-289)

Module 4: Future Challenges and Opportunities

12/1: Future of Spatial Thinking; Work on Final Project

12/3: Present and Submit Final Project

Read Harvey (Chapters 15, pp. 290-299)

11. Laboratory Topics & Protocols

The laboratory sessions will be organized around the following lab topics. The dates shown to the left of the individual topics indicate the date of a given lab activity. Each lab assignment is due at the beginning of the next lab session.

Getting Started in the SSI Computer Lab

8/27: Log-in, Data Access, and Software System

ArcGIS Skill Development and Acquisition

9/3: Lesson 1a: Explore the study area

9/10: Lesson 1b: Do exploratory analysis

9/17: Lesson 2: Preview data

9/24: Lesson 3: Choose the data

10/1: Lesson 4: Build the database

10/8: Lesson 5: Edit data

10/15: Lesson 6: Conduct the analysis

10/22: Lesson 6 continued: Field work -- feasibility assessment

10/29: Lesson 7: Automate the process

11/5: Lesson 8: Present analysis results

11/12: Lesson 9: Share results online

11/19: GIS Day

11/26: Lab Practical

Each lab session will start on the hour and will begin with a brief introduction to the topic of investigation. These introductions will take no longer than 10 minutes – make sure to arrive to lab on-time so you do not miss introductory comments. Some self-guided work tasks using one or more geospatial datasets will then follow for the remainder of the lab session. Lab sessions will also include a roundtable discussion of the tasks completed, what it means, and how these tasks might have been varied and/or enhanced if performed by professionals in a real world setting.