SSCI 301L – MAPS AND SPATIAL REASONING

Course: SSCI 301L – Maps and Spatial Reasoning

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

Lecture: Tuesday & Thursday 10-11:20am

Lab: Tuesday 11:30am-1:20pm

Location: AHF (Allan Hancock Foundation) B57A

Website: www.blackboard.usc.edu

Instructor: Dr. Darren Ruddell

Office: AHF Building B55K

Email: druddell@usc.edu

Website: http://spatial.usc.edu

Skype: darren.ruddell

Twitter: @GIST_Prof

Office Hours: 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 public, private, and not-for-profit organizations 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;
- Describe the goals and contents of key geographic applications such as Bing maps, Google Earth, MapQuest, OpenStreetMap, and the U.S. National Map;
- 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.

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

<table>
<thead>
<tr>
<th>Laboratory Assignments</th>
<th>40%</th>
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<tbody>
<tr>
<td>Research Paper</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm Examination</td>
<td>15%</td>
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<tr>
<td>Final Examination</td>
<td>30%</td>
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Please note that no make-up opportunities will be offered for missed tests or exams. If you have a legitimate conflict, speak with me as soon as possible so we can make alternative arrangements.

5. Textbooks

**Required Texts:**


Related Texts:


6. 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).

7. 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.

8. Important Administrative Dates
8/27: Fall semester classes begin
9/3: Labor Day, university holiday
9/14: 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
11/16: Last day to drop a class with a mark of “W”
11/21-24: Thanksgiving recess, university holiday
12/7: Fall semester classes end
12/8-11: Study days
12/18: Final examination (8-10:00am)
9. **Course Outline**

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

**Module 1: Core Concepts**

8/28: Introduction to Course  
8/30: Maps and Spatial Reasoning  
*Read Harvey (Chapter 1, pp.3-33)*

9/4: Geographic Representation  
9/6: Choices for Cartographic Representation  
*Read Harvey (Chapter 2, pp. 34-52)*

**Module 2: Map Principles**

9/11: From a Round to a Flat Surface: Projections  
9/13: Additional Choices in Map Making  
*Read Harvey (Chapter 3, pp. 53-72)*

9/18: Making Projections: Earth Models and Datums  
9/20: Types of Projections and Their Characteristics  
*Read Harvey (Chapter 4, pp. 75-101)*

9/25: Projections throughout History  
9/27: How to Set Locational and Coordinate Systems  
*Read Harvey (Chapter 5, pp. 102-126)*

**Module 3: Spatial Analysis and Reasoning**

10/2: Databases  
10/4: Geographic Information Systems  
*Read Harvey (Chapter 6, pp. 127-138)*

10/9: Geographic Positioning Systems  
10/11: GPS in the Field  
*Read Harvey (Chapter 7, pp. 139-159)*

10/16: Remote Sensing  
10/18: Remote Sensing in Practice  
*Read Harvey (Chapter 8, pp. 160-173)*

10/23: Positions, Networks, Fields, and Geographic Information  
10/25: Examples of Geographic Information Representation Transformations  
*Read Harvey (Chapter 9, pp. 174-189)*
10/30: Mid-term Exam
11/1: Cartographic Representation
Read Harvey (Chapter 10, pp. 193-220)

11/6: Maps, Power, and Empowerment
11/8: Culture and the Use and Misuse of Geographic Information
Read Monmonier (whole book) plus Harvey (Chapter 11, pp. 221-250)

11/13: Government Mapping Agencies and the Administration of Spaces
11/15: Crowd Sourcing and Volunteered Geographic Information
Read Harvey (Chapter 12, pp. 253-250)

11/20: Geographic Information and Spatial Analysis
11/22: Thanksgiving Holiday
Read Harvey (Chapter 13, pp. 253-270)

11/27: Examples of Spatial Analysis
11/29: Geostatistics
Read Harvey (Chapter 14, pp. 271-289)

Module 4: Future Challenges and Opportunities

12/4: Future of Spatial Thinking as an Analytical Tool
12/6: Course Review
Read Harvey (Chapters 15, pp. 290-299)

10. 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 Monday or Tuesday on which these labs start.

Role of Spatial Perspectives in characterizing Selected Human Activities
9/4: Demographic Mapping: Your Community, Your Region
9/10: Food Expenditure Analysis
9/17: Evaluating a Business Site Location
9/24: Population Drift: Mean Center Analysis 1790-2010

Role of Spatial Perspectives in Showing How Nature Helps to Shape Humanity
10/1: Haiti, January 2010 Earthquake Analysis
10/8: Groundwater as a Shared Resource
10/15: Historical Tornado Patterns and Trends
10/22: Extreme Temperature Patterns and Trends
10/29: Hurricane Katrina: Understanding Physical and Social Vulnerability
Role of Spatial perspectives in Showing how Humanity Influences Nature
11/5: Timber Harvesting Plans
11/12: Floods and Toxic Spills in Hungary and Beyond
11/26: Forest planning for Sensitive Wildlife Species
12/3: Sustainability and Science: The Ecology of Everyday Decisions

Each of the lab sessions will start on the hour with a brief introduction from the Graduate Teaching Assistant responsible for the lab. These introductions will take no longer than 10 minutes and students arriving more than 10 minutes after the scheduled start times for their laboratory sessions will be turned away and assigned a zero grade for that particular lab assignment. Some self-guided work tasks using one or more geospatial datasets will then follow for approximately an hour after which time the Graduate Teaching Assistant will convene a 15 minute roundtable discussion of what you have done, what it means, and how these tasks might have been varied and/or enhanced if performed by professionals in a real world setting. The final 30 minutes of the lab sessions will be available for each of you to prepare and submit your final lab report for grading. No lab reports will be accepted for grading if handed in outside of the regularly scheduled lab session.