USC Dornsife
Dana and David Dornsife
College of Letters, Arts and Sciences
Spatial Sciences Institute

SSCI 301L - Maps and Spatial Reasoning

Syllabus

Units: 4

Term, Day, Time: Fall, 2016, Monday and Wednesday 2:00-3:20 p.m.

Location: Lectures: VPD 116; Labs: AHF 145A

Instructor: Darren Ruddell, Ph.D. GISP
Office: AHF B57F
Office Hours: Tuesdays, 11:30 a.m. – 12:30 p.m., Wednesdays, 9 – 10 a.m., and by appointment
Contact Info: druddell@usc.edu, 213-740-0521

Laboratory Co-Instructor: Elisabeth Sedano, Ph.D.
Office: AHF B57C
Office Hours: Fridays 1-2 p.m., and by appointment
Contact Info: sedano@usc.edu, 213-740-9582

Laboratory Co-Instructor: Jason Post
Office: AHF B56A
Office Hours: Tuesdays and Wednesdays 1-2 p.m., and by appointment
Contact Info: jpost@usc.edu, 213-821-0466

Library Help: Katharin Peter
Office: VKC B40A
Office Hours: By appointment
Contact Info: kpeter@usc.edu, 213-740-1700 (office)

IT Help: Richard Tsung
Office: AHF 146
Hours of Service: Mondays to Fridays, 9:00 a.m.-5:00 p.m.
Contact Info: ctsung@usc.edu, 213-821-4415

Course Description

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: social workers use GIS to track where clients live and where more social services are needed, urban planners use GIS to analyze the transformation of city spaces, 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 and/or academic interests. 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.

This course is designed to serve several different student audiences given its role as a required course in the B.S. in GeoDesign, B.S. in Environmental Studies, and minor in Spatial Sciences. Each audience is encouraged to utilize the laboratory experience and self-directed capstone final project research assignment to explore geospatial resources and computational techniques, such as data modeling, spatial analysis, and data visualization learning with their own academic and professional goals.

Learning Objectives

Students who excel in SSCI 301L will:

- 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;
- Recognize the main types of maps and understand the issues that underlie geographic modeling and the creation of maps;
- Understand the breadth of modern mapping technologies and the social ramifications of the rapidly expanding field.

Prerequisite(s): None

Co-Requisite (s): None

Concurrent Enrollment: None

Recommended Preparation: None

Course Structure

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 used 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 project will have a laboratory component to them. **It is required that you register for both the lecture and one laboratory session for this course.**

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

Technological Proficiency and Hardware/Software Required

The modeling software and geospatial data required for course assignments will be accessed using computing resources provided by the Spatial Sciences Institute.

Required Readings

The required textbooks for this course are:

- Harder, C, Ormsby, T, and Balstrom, T. 2013. *Understanding GIS: An ArcGIS Project Workbook* (Second Edition). California, Esri Press.
- Harvey, F. 2016. *A Primer of GIS: Fundamental Geographic and Cartographic Concepts* (Second Edition). New York, Guilford Press.
- Monmonier, M. 1996. *How to Lie with Maps* (Second Edition). Chicago, University of Chicago Press.

Description and Assessment of Assignments

Your grade in this class will be determined on the basis of several different assessments:

Class Participation (10%): A class participation grade for the semester will be assigned based on your engagement in class. Students are expected to complete and discuss assigned reading, engage in lecture, share and discuss course assignments, complete and discuss in-class assignments, among other forms of active engagement in the course.

Social Media Interactions (10%): Students will be required to engage and share course concepts via Twitter. 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. 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. We will use the hashtag #SSCI301 to ensure that tweets are incorporated into the class discussion. Any tweets that do not contain this hashtag will not be counted towards weekly activity. Your social media grade will be graded on a pass/fail basis. If you tweet the requisite number of times (a minimum of three tweets per week 3X15 = 45 total tweets), you will receive full credit. If not, then you will receive a score of zero.

Laboratory Assignments (25%): This course includes a laboratory meeting each week to develop technical competency with geospatial software platforms and analytic tools. There will be a total of ten laboratory assignments over the course of the semester, and one week will include a field work assignment within greater Los Angeles.

Laboratory Practical (15%): The Lab Practical serves as an examination of your proficiency with the Esri Ecosystem. The scope of the Lab Practical will be limited to geospatial tools that have been introduced and explored in this course. Students are expected to take the in-class Lab Practical at the indicated time.

Mid-term Exam (20%): The mid-term exam will consist of multiple choice, short answer, and simple problem questions. Students will be expected to take the exam at the indicated time.

Final Project (20%): The final project is the capstone assignment for this course, and students will be expected to draw upon course lectures, discussions, lab assignments, readings, and outside sources to organize and deliver a self-directed study on a topic of interest utilizing spatial analysis and geospatial technologies. The report is limited to 10 pages (with 12-point font, 1 inch margins, single-spacing for text) and will include one or more maps, tables, and other diagrams as well as a list of references.

Grading Breakdown

Assessment	Number	Points Each	Total Points
Class Participation	NA	NA	10
Social Media Interactions	45	NA	10
Laboratory Assignments	10	2.5	25
Laboratory Practical	1	15	15
Mid-term Examination	1	20	20
Final Project	1	20	20
TOTAL	58	-	100

Assignment Submission Policy

Assignments will be submitted for grading via Blackboard by the due dates specified in the Course Schedule below.

Additional Policies

Students are expected to attend and participate in every class session and to complete and upload all assignments before the deadlines detailed in the Course Schedule. Late work will be assessed a penalty of 10% per day and zero grades will be assigned for work that is more than seven days late.

Course Schedule

	Topic	Readings and Assignments	Deliverables/Due Dates
Week 1 8/22	**Introduction to the Course** Introduction to the class and discussion of goals, assignments, projects, and technology	Reading: Harvey Chapter 1 and 2	Complete by 8/26: Social media postings
8/24	**Maps and Spatial Reasoning** A discussion of theories and techniques for analyzing human and environmental processes		

Week 2 8/29 8/31	**History of GIS** A discussion on the history, uses, and innovations of GIS; GTCM **Representation and Data Models** Discussion of methods and issues relating to representing the physical world in digital and print maps	Reading: Harvey Chapter 3; Monmonier Chapter 1 and 2 Assigned: Lab: Lesson 1a. Explore the study area	Complete by 9/2: Social media postings
Week 3 9/5 9/7	**Labor Day Holiday (no class)** **Maps** Discussion of types of maps, key mapping ideas, and common mapping issues	Reading: Harvey Chapter 4; Monmonier Chapter 3 Assigned: Lab: Lesson 1b: Do exploratory analysis	Complete by 9/9: Social media postings; Lab Lesson 1a: Explore the study area
Week 4 9/12 9/14	**Projections** Discussion and explanation of map projections **Geoids, Spheroids, and Coordinate Systems** Overview of concepts and terms relating to coordinate systems	Reading: Harvey Chapter 5 and 6 Assigned: Lab: Lesson 2: Preview data	Complete by 9/16: Social media postings; Lab Lesson 1b: Do exploratory analysis
Week 5 9/19 9/21	**Scale** Discuss concept of scale in cartography as well as physical and social processes **Final Project** Discuss expectation and past examples for capstone final project	Reading: Harvey Chapter 7; Monmonier Chapter 4 Assigned: Lab: Lesson 3: Choose the data; and Final Project	Complete by 9/23: Social media postings; Lab Lesson 2: Preview data
Week 6 9/26 9/28	**Data Resources** Explore and discuss spatial data sources for spatial analysis **Spatial Databases** Discussion of spatial databases – utility, design, and maintenance	Reading: Harvey Chapter 11 and 12; Monmonier Chapter 5 and 6 Assigned: Lab: Lesson 4: Build the database	Complete by 9/30: Social media postings; Lab Lesson 3: Choose the data
Week 7 10/3 10/5	**Cartography** Discussion of map design principles, symbology, and cartographic technique **Graphic Elements** The use of graphics to communicate, stylize, and problem solve	Reading: Harvey Chapter 8 and 9; Monmonier Chapter 7 Assigned: Lab: Lesson 5: Edit data	Complete by 10/7: Social media postings; Lab Lesson 4: Build the database

Week 8 10/10 10/12	**Global Navigation Satellite Systems** Overview of technologies and uses of GNSS and GPS **Geospatial Data Collection** Discussion of geospatial data collection workflows, and primary data collection in the field	Reading: Harvey Chapter 10; Monmonier Chapter 8 and 9 Assigned: Lab: Lesson 6: Conduct the analysis	Complete by 10/14: Social media postings; Lab Lesson 5: Edit data
Week 9 10/17 10/19	**Conduct Field Work** Conduct field work on LA River **Mid-term Exam**	Assigned: Lab: Lesson 6 continued: Field work – feasibility assessment	Complete by 10/21: Social media postings; Lab Lesson 6: Conduct the analysis
Week 10 10/24 10/26	**Spatial Data Quality** Guest lecture by USC GIS Librarian on evaluating and maintaining spatial data quality **Data Correction** View, analyze, and correct data from fieldwork project	Reading: Harvey Chapter 13; Monmonier Chapter 10 and 11 Assigned: Lab: Lesson 7: Automate the process	Complete by 10/28: Social media postings; Lab Lesson 6 continued: Field work – feasibility assessment
Week 11 10/31 11/2	**Remote Sensing** Overview of remote sensing technologies and uses **Remote Sensing in Practice** Guest lecture on the professional uses of remote sensing	Reading: Harvey Chapter 14; Monmonier Chapter 12 and 13 Assigned: Lab: Lesson 8: Present analysis results	Complete by 11/4: Social media postings; Lab Lesson 7: Automate the process
Week 12 11/7 11/9	**GIS Day Preparation** Overview of technologies and cultural changes leading to data creation and mapping by non-professionals **Volunteered Geographic Information** Overview of technologies and uses of crowd-sourced data	Reading: Harvey Chapter 15 Assigned: Lab: Lesson 9: Share results online	Complete by 11/11: Social media postings; Lab Lesson 8: Present analysis
Week 13 11/14 11/16	**Administration of Spaces and Locational Privacy** Overview of government and private sector data and issues related to data collection and analysis **GIS Day** Lead GIS Day event on campus	Reading: Harvey Chapter 16 Lab Practical	Complete by 11/18: Social media postings; Lab Lesson 9: Share results online

Week 14 11/21 11/23	**Geostatistics** Introduction to the use of geostatistics in spatial analysis **Thanksgiving Holiday (no class)**	Reading: Harvey Chapter 17	Complete by 11/23: Social media postings
Week 15 11/28 11/30	**Final Project Presentations** Students present their final projects in class **Final Project Presentations** Students present their final projects in class		Complete by 12/2: Social media postings
Week 16 12/9	**Final Exam**		Complete by 12/9: Final Project

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* https://policy.usc.edu/student/scampus/part-b/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* http://equity.usc.edu or to the *Department of Public Safety* http://adminopsnet.usc.edu/department/department-public-safety. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Relationship and Sexual Violence Prevention Services* http://engemannshc.usc.edu/rsvp/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs*

http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

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).