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

SSCI 301, Maps and Spatial Reasoning

Syllabus

Units: 4

Term Day Time: Fall 2019
Lecture: Tuesday and Thursday, 9:30-10:50 am
Labs: See schedule

Location: LV 17 (Lecture); AHF 145A (Lab)

Instructor: Laura C Loyola, PhD
Office: AHF B56G
Regular Office Hours: Tues 11 am-12 pm and Wed 2-3 pm PT. Also available most days and times by appointment via email.
Contact Info: loyola@usc.edu, 213-740-5612, www.bluejeans.com/loyola

Lab Instructor: TBD
Office: AHF B56A
Office Hours: Also available by appointment via email.
Contact Info:

Library Help: Andy Rutkowski
Office: VKC 36B
Office Hours: Tue 10 am-12 pm and Thu 4:30-5:30 pm PT
Contact Info: arutkows@usc.edu, 213-740-6390
http://bit.ly/andyhangout

IT Help: Richard Tsung
Office: AHF 145D
Office Hours: By appointment
Contact Info: spatial_support@usc.edu, 213-821-4415

Course Scope and Purpose

Maps have long played a role in the production and use of geographic information. They support many different kinds and levels of spatial reasoning, from simple queries (route finding, proximity analysis) to more advanced forms of spatial analysis and modeling. An explosion in geographic information (GI) technologies over the past two decades has enabled the development of quick visualization tools (Google Maps), sophisticated GISystems (GIS) such as ArcGIS and TerrSet, and many kinds of GPS-enabled sensors. Users can be found across society: 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 transformations 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 – to name a few.

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 introduces 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 will 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 Global Geodesign, B.S. in Environmental Studies, and the GIS and Sustainability Science, Human Security and Geospatial Intelligence, and Spatial Sciences Minors. Each student is encouraged to utilize the laboratory experience and self-directed capstone research project to explore geospatial resources and computational techniques, such as data modeling, spatial analysis, and data visualization, learning with their own academic and professional goals in mind.

Learning Outcomes

On completion of this course, students should be able to:

- Explain how modern geographic analysis and visualization tools can be used across a variety of disciplines;
- Describe the main types of maps and discuss the issues that underlie geographic modeling and the creation of maps;
- Demonstrate the understanding of data representation methods by creating meaningful maps; and
- Apply modern mapping and GIS technologies to problem solving within diverse fields of study.

Prerequisite(s): None
Co-Requisite(s): 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 via Blackboard, and the exams will all 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 am PT on the first day of classes**.**

Technological and Communication Requirements

This class incorporates in-class activities that at times may be completed on a smart phone, tablet, or laptop computer. If a student does not have access to any of these, please speak with the instructor at the start of the semester to establish a workaround. Twitter accounts are also recommended for this class. This can be a new account, dedicated specifically to the course, or your own already established account. If you need assistance setting up the account, or learning how to tweet, please see the instructor for assistance. Tweets can be completed on a computer; a smart phone is not needed. The modeling software and geospatial data required for course assignments will be accessed using computing resources provided by the Spatial Sciences Institute. No previous experience is required.

SSI Server and Tech Support – This course utilizes the SSI Server, which is a virtual desktop giving access to many different professional software programs. If you are unable to connect to the server or experience any type of technical issues, send an email using your USC account to Tech Support at spatial_support@usc.edu, making sure to copy (cc) your instructor on the email. Questions pertaining to specific assignments should be directed to your lab instructor.

Required Readings and Supplementary Materials

The required textbooks for this course are:

- Kimerling, A. Jon, Aileen R. Buckley, Phillip C. Muehrcke, and Juliana O. Muehrcke. 2016. *Map Use: Reading, Analysis, Interpretation*, 8th Ed., Redlands, CA: Esri Press.
- Smith, David, Nathan Strout, Christian Harder, Steven Moore, Tim Ormsby, and Thomas Blastrom. 2018. *Understanding GIS: An ArcGIS Pro Project Workbook*, 4th Ed., Redlands, CA: Esri Press.

The following readings will be posted to Blackboard:

- Bearman, Nick, Nick Jones, Isabel André, Herculano Alberto Cachinho, and Michael DeMers. 2016. "The future role of GIS education in creating critical spatial thinkers." *Journal of Geography in Higher Education* 40(3): 394-408.
- Cetl, Vlado, Tomáž Kliment, and Tomislav Jogen. 2017. "A Comparison of Address Geocoding Techniques – Case Study of the City of Zagreb, Croatia." *Survey Review*, 50:359.
- Goodchild, Michael. 2007. "Citizens as Sensors: The World of Volunteered Geography." *GeoJournal* 69(4): 211-221.
- Harley, John Brian. 2001. *The New Nature of Maps: Essays in the History of Cartography*. Baltimore, MD: The Johns Hopkins University Press. (chapter 2)
- Harvey, Francis. 2016. *A Primer of GIS: Fundamental Geographic and Cartographic Concepts* (Second Edition). New York: Guilford Press. (chapters 4 and 8).
- Hubbard, Phil, Rob Kitchin, Brendan Bartley, and Duncan Fuller. 2002 (reprint 2005). *Thinking Geographically: Space, Theory and Contemporary Human Geography*. New York: Continuum. (chapter 1)
- Krygier, John and Denis Wood. 2016. *Making Maps: A Visual Guide to Map Design for GIS*. New York: Guilford Press. (selected chapters)
- McIntosh-Tolle, Lindsay. *How to Use a Compass*. REI. Available at https://www.rei.com/learn/expert-advice/navigation-basics.html.
- Monmonier, Mark. 1996. How to Lie with Maps (Second Edition). Chicago: University of Chicago Press. (selected chapters)
- Van Oort, P.A.J. (Pepijn). 2005. *Spatial Data Quality: From Description to Application.* Doctoral dissertation, Netherlands Geodetic Commission, Delft. (selected chapters)
- Zeiler, Michael and Jonathan Murphy. 2010. *Modeling Our World: The Esri Guide to Geodatabase Concepts*. Redlands, CA: Esri Press.

Description and Assessment of Assignments

Weekly Assignments

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

In-Class Work and Social Media Interactions (10%): A grade for the semester will be assigned based on your engagement in class, discussion posts and/or social media (Twitter) interactions. 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. Students will be required to also engage with and share course concepts via the Discussion Board or Twitter. Although we will sometimes use these tools in the classroom, the bulk of your activity will take place outside of class. You will be required to engage with these tools a minimum of one (1) time per week. There are a few simple guidelines for posts on the Discussion board or Twitter: 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; 3) they must be respectful; and 4) tweets must include the hashtag

#SSCI301 to ensure that they are incorporated into the class discussion. Any tweets that do not contain this hashtag will not be counted towards weekly activity. If you post the requisite number of times (a minimum of once per week), and participate in class you will receive full credit. If not, then you will receive partial credit commensurate with the number of weeks in

Laboratory Assignments (30%): 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 reports due over the course of the semester, and one week will include a field assignment within greater Los Angeles.

Mid-Term Exams (30%): The mid-term exams will be mixed format and may consist of multiple choice, short answer, and simple problem questions. Students are expected to take the exams at the indicated times.

Final Project (15%): The final project is the capstone assignment for this course. Students will be expected to draw upon course lectures, discussions, lab assignments, readings, and outside sources to organize and deliver a self-directed study utilizing spatial analysis and geospatial technologies. The four deliverables for this project are: 1) a project proposal; 2) a mid-project report; 3) a final written report; and 4) an oral presentation in class.

Final Exam (15%): The final exam may consist of multiple choice, short answer, and simple problem questions. Students are expected to take the exam at the indicated time.

Grading Breakdown

Assessment	Number	Points Each	Total Points
Class Participation and Social Media Interaction	30		10
Laboratory Assignments	10	3	30
Mid-term Exams	2	15	30
Final Project	1	15	15
Final Exam	1	15	15
Total		-	100 points

Assignment Submission Policy

Students are expected to attend and participate in every class and lab session and to complete and upload all assignments before the deadlines detailed in the Course Schedule. All assignments will be submitted for grading via Blackboard. 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. Additionally, no work will be accepted for grading after 5 p.m. PT on the last day of classes.

Schedule

	Topic	Readings and Assignments	Deliverables/Due Dates
Week 1 8/27 8/29	**Introduction to the Course** Introduction to the class and discussion of goals, assignments, projects, technology, and the value of spatial thinking **Maps and Spatial Reasoning** A discussion of key concepts underlying spatial sciences, the scientific method, and spatial reasoning	Kimerling, Introduction; Hubbard, Ch. 1; Monmonier, Ch. 1; Krygier and Wood, Ch. 4 (optional)	No labs
Week 2 9/3* *Monday, 9/2 is university holiday 9/5	**History of GIS** A discussion on the history, uses, and innovations of cartography and GIS; Introduction to the GTCM; Introduction to lab activity **Types of Maps & Digital Representation of Data** Discussion of methods and issues relating to representing the physical world in digital and print maps	Harvey, Ch .4; Kimerling, Ch. 7-9 (9 is optional)	Lab Report 1: Exploring maps/Due one week after lab (Monday labs do NOT meet)
Week 3 9/10 9/12	**Maps, Knowledge, & Power** Discussion of mapping issues and the power inherent in creating maps and its historical consequences **Geodesy; Geoids, Spheroids, and Coordinate Systems** Overview of concepts and terms relating to coordinate systems	Harley, Ch. 2; Monmonier, Ch. 7, 8, and 10 (10 is optional); Kimerling, Ch. 1 & 4	Lab Report 2: Census data and political boundaries/Due one week after lab
Week 4 9/17 9/19	**Projections** Discussion and explanation of map projections and their importance; projection activity **PCS; Scale** Projected Coordinate Systems; Discuss concepts of scale in physical and social processes as well as in cartography	Kimerling, Ch. 3 & 2	Lab Report 3: UGIS Lessons 1 – 2/Due one week after lab

	Topic	Readings and Assignments	Deliverables/Due Dates
Week 5 9/24 9/26	**Final Project Discussion; Midterm Review** Discuss expectations, rubric and past examples of capstone project; Open session for questions and review prior to Midterm #1 **Midterm #1 – Closed Book**	Krygier and Wood Ch. 7 (for reference for lab)	Lab Report 4: UGIS Lessons 3 – 4/Due one week after lab
Week 6 10/1 10/3	**Cartography and Graphic Elements** Discussion of map design principles, symbology, and cartographic technique. The use of graphics to communicate, stylize, and problem solve **Orienteering** Discussion and exercise with traditional methods for wayfinding; review data processing for lab	Kimerling, Ch. 2, 6, and 13; McIntosh-Tolle	Lab Report 5: Map Production: Result of UGIS Lessons 5 – 6/ Due one week after lab Note: Self-work UGIS Lessons 7 – 9 DUE Week 11
Week 7 10/8 10/10	**Global Navigation Satellite Systems** Overview of technologies and uses of GNSS and GPS **Geospatial Data Collection and Correction** Discussion of geospatial data collection workflows and primary data collection; accuracy and precision	Harvey, Ch 8; Kimerling, Ch. 11	Lab Report 6: Evaluating Core Geospatial Datasets/Due one week after lab
Week 8 10/15* *10/17-18 is a university holiday	**Spatial Data Quality** Discussion on evaluating and maintaining spatial data quality	Van Oort, Ch. 1 & 2	No Regular Lab Meetings Self-Directed Fieldwork **Monday labs meet*

	Topic	Readings and Assignments	Deliverables/Due Dates
Week 9 10/22 10/24	**Geocoding** Exploration of the problems associated with place-names, street addresses and other human systems and how to define real-world locations **Data Resources** Explore and discuss spatial data sources for spatial analysis, the "New World" of data, research methods	Cetl, et al.;	Lab Report 7: Data processing from fieldwork; mapping of data/Due one week after lab
Week 10 10/29 10/31	**Project Proposal; Review** In class peer-review of final project proposal, including proposed data; Open session for questions and review prior to Midterm #2 **Midterm #2 – Closed Book**		Lab Report 8: Geocoding exercise/Due one week after lab
Week 11 11/5 11/7	**Locational Privacy and Administration of Spaces** Overview of government and private sector data and issues related to data collection and analysis; discussion of traditional knowledge and place names **Remote Sensing** Overview of remote sensing technologies and uses	Kimerling, Ch. 5, 10, and pp.239 - 243; Monmonier, Ch 6	Lab Report 9: Visualization of remotely sensed data using Google Earth Pro/Due one week after lab **Self-work: UGIS Lessons 7 – 9 DUE 11/8**
Week 12 11/12 11/14	**GIS Day Event** In-class special event **Remote Sensing in Practice** Overview of the professional uses of remote sensing		Lab: Work on Final Project: Final Project Mid-Project Report (part of Final Project grade)/Due one week after lab

	Topic	Readings and Assignments	Deliverables/Due Dates
Week 13 11/19 11/21	**Crowdsourcing Spatial Data** Discussion of technologies and cultural changes leading to data creation and mapping by non-professionals; fitness for use and quality management **Volunteered Geographic Information** Case studies of technologies and uses of crowd-sourced data: MapCreator and OSM introduction	Goodchild	Lab Report 10: Creating VGI/Due one week after lab
Week 14 11/26* 11/27-12/1 is a university holiday	**Overview of Spatial Statistics; the Future of GIS** Introduction to the use of spatial statistics in spatial analysis	Bearman et al.	No labs
Week 15 12/3 12/5	**Final Project Presentations** Students present their final projects in class **Final Project Presentations** Students present their final projects in class		Computer lab room open during scheduled lab for work on final projects Final Project Written Reports/Due by 12/6 5:00pm Study Days (12/7-12/10)
Final Exam 12/12	THURSDAY, 12/12, 11:00 am – 1:00 pm Final exam – **CLOSED BOOK**		

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 Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/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.

Support Systems

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call
engemannshc.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline – 1 (800) 273-8255 – 24/7 on call
www.suicidepreventionlifeline.org
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
equity.usc.edu, titleix.usc.edu
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support – (213) 740-2421
https://titleix.usc.edu/reporting-options/
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs – (213) 740-0776

dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

Student Support and Advocacy – (213) 821-4710
studentaffairs.usc.edu/ssa
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC – (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety – - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.

Resources for Online Students

The Course Blackboard page and the GIST Community Blackboard page have many resources available for distance students enrolled in our graduate programs. In addition, all registered students can access electronic library resources through the link https://libraries.usc.edu/. Also, the USC Libraries have many important resources available for distance students through the link: https://libraries.usc.edu/faculty-students/distance-learners. These include instructional videos, remote access to university resources, and other key contact information for distance students.