

SSCI 135g, Maps in the Digital World

Syllabus

Units: 4

Term Day Time: Fall 2021

Lectures: MWF 10:00 AM – 11:20 PM.

This course is planned to be delivered in an in-person format. All meetings will be streamed for remote access for maximum options and accessibility.

Location: WPH 603 & Online

Instructor: Jennifer N. Swift, PhD GISP

Office: AHF B57D

Regular Office Hours Mondays 8:30am-9:30am am PT.

Additional hour TBA. Also available most days and times by appointment via email.

Contact Info: jswift@usc.edu, 213-740-5841 (office), see contact page on Blackboard for Zoom Room

Library Help: Andy Rutkowski

Office: VKC B36B

Office Hours: Tuesdays 10:00 a.m.-12:00 p.m. and Thursdays 4:30-5:30 p.m.

Contact Info: arutkows@usc.edu, 213-740-6390 (office), see contact page on Blackboard for Zoom Room

IT Help: Richard Tsung

Office: AHF B57E

Office Hours: By appointment

Contact Info: ctsung@usc.edu, 213-821-4415 (office)

Course Scope and Purpose

This course explores all the ways in which maps are being used to compile, build, and share knowledge of the world around us. The first maps appeared long ago, and today maps are used extensively across the physical, life, and social sciences as well as the humanities. Numbers and quantitative data feature prominently in the preparation of most maps. The overarching intent of this course is to examine some of the ways in which formal reasoning, abstract representation, and empirical analysis are used to construct the maps that you see and use in a given field of study and in everyday life. The topics covered in this course will range from geodetic principles (the way location is measured on the Earth's surface) to the various ways in which information is captured and represented on maps, the role of scale and map projections, and the ways in which various hierarchies and classifications can be combined and used with empirical analysis to add meaning to maps

This course is a Quantitative Reasoning General Education course. Maps are used to engage you in the analysis and manipulation of data and information related to quantifiable objects, symbolic elements, and logic to help navigate the complexity and sophistication of the modern world. The lectures and accompanying homework assignments will focus on the role of maps in modern life and how numbers are used to construct maps of the world around us. The assignments and final project will increase your capacity to evaluate chains of formal reasoning (the use of formal logic and mathematics), abstract representation (the use of symbolic and diagrammatic representations), and empirical analysis (the use of statistical inference) in building and interpreting various kinds of maps.

Learning Outcomes

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

- Describe and interpret the complexity and sophistication of the modern world.
- Use a set of formal tools, including logical and statistical inference, probability, and mathematical analysis, to pose and evaluate hypotheses, claims, questions, or problems with a variety of maps.
- Distinguish between their assumptions and implications for the logical structures embedded in various kinds of maps.
- Identify both useful and specific applications of the various kinds of maps they study because maps are now a pervasive part of our everyday lives and by the end of the course.

Prerequisite(s): None

Co-Requisite(s): None

Class Conduct

Harassment, sexual misconduct, interpersonal violence, and stalking are not tolerated by the university. All faculty and most staff are considered Responsible Employees by the university and must forward all information they receive about these types of situations to the Title IX Coordinator. The Title IX Coordinator is responsible for assisting students with supportive accommodations, including academic accommodations, as well as investigating these incidents if the reporting student wants an investigation. The Title IX office is also responsible for coordinating supportive measures for transgender and nonbinary students such as faculty notifications, and more. If you need supportive accommodations you may contact the Title IX Coordinator directly (titleix@usc.edu or 213-821-8298) without sharing any personal information with me. If you would like to speak with a confidential counselor, Relationship and Sexual Violence Prevention Services (RSVP) provides 24/7 confidential support for students (213-740-9355 (WELL); press 0 after hours).

Course Structure

The course will be organized around seven modules and the accompanying lecture and classroom exercise (homework) topics.

Technological and Communication Requirements

ArcGIS is provided online via the GIST Server; hence, you do not need to install it on your own computer. Instead, every student must have the following technology requirements:

- A computer with a fast Internet connection.
- A functional webcam and a microphone for use whenever a presentation or meeting is scheduled.
- An up-to-date web browser to access the Server

If a student does not have access to any of these, please speak with the instructor at the start of the semester. Also, see the USC ITS Student Toolkit here:

<https://keepteaching.usc.edu/students/student-toolkit/>

Required Readings and Supplementary Materials

The required textbook for this course is:

- Arlinghaus, Sandra L and Joseph Kerski. 2014. *Spatial Mathematics: Theory and Practice through Mapping*. Boca Raton, FL: CRC Press. Available online via USC Libraries.

The supplementary readings are:

- de Smith, Michael J., Michael F. Goodchild and Paul A. Longley. 2018. *Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools*, 6th Edition. Winchelsea, UK: The Winchelsea Press. Available in both print and a (free!) web version at www.spatialanalysisonline.com.

- MacEachern, Alan M. 1995. *How Maps Work*. New York: Guilford Press.
- Mason, Betsy and Miller, Greg. 2018. *All Over the Map: A Cartographic Odyssey*. Washington, DC: National Geographic.
- Monmonier, Mark. 2018. *How to Lie with Maps*, 3rd Edition. Chicago, IL: University of Chicago Press.
- Unwin, David J. 2010. "Numbers Aren't Nasty: A Workbook of Spatial Concepts." *Spatial Literacy in Teaching*, Chapter 3. Available at http://teachspatial.org/wp-content/uploads/Unwin-Spatial-Workbook_Chapter3_0.pdf

Description and Assessment of Assignments

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

Home Assignments – 10 worth a total of 50 points. In addition to lectures and in-class discussions, there are a series of home assignments designed to introduce the tools of quantitative reasoning and provide practical experience in implementing these tools to explore various problems within the framework of the scientific method. These assignments are linked to the lectures and class discussions but do not duplicate the classroom experience. Home assignments will be graded and returned, and the mid-term and final exams will have a home assignment component to them. In other words, the home assignments are an important and integral part of the course as a whole. Some of the home assignment options available – and there may be more – include:

- Mental Maps
- Routes, Coordinates, Precision, and Accuracy
- Measuring the Circumference of the Earth
- Measuring Positions on the Earth's Surface
- Transformations and Raster/Vector Analysis
- Role of Color and Image Interpretation
- Role of Scale and Dot Density Maps
- Classification and Normalization of Data
- Role of Traditional and Hexagonal Hierarchies
- Examining the Distribution of Tornado Data
- Calculating Mean Centers and Standard Derivational Ellipses
- Comparing Map Projections
- Network Analysis

Note that more than 10 home assignments may be required. If this is the case, only the 10 highest scores will be counted toward your final grade.

Mid-term Examination – 1 worth 14 points. The mid-term examination will consist of multiple-choice, short answer, and essay questions. Students will be expected to take the exam at the indicated time.

Final Project – 1 worth 14 points. The final project is an individual capstone report for this course. Students will be expected to draw upon course lectures, discussions, readings, and outside sources to organize and deliver a self-directed study on a topic of interest. 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.

Final Examination – 1 worth 22 points. The final examination will consist of multiple-choice, short answer, and essay questions. Students will be expected to take the exam at the indicated time.

Grading Breakdown

Assessment	Number	Points Each	Total Points
Home Assignments (HA)	10	5	50
Mid-term Examination	1	14	14
Final Project	1	14	14
Final Examination	1	22	22
Total	13	-	100 points

Assignment Submission Policy

Unless otherwise noted, assignments must be submitted via Blackboard by the due dates specified in the Course Schedule in the next page and on the assignment instructions.

Strict penalties apply for late assignments as follows:

- All assignments will be penalized 1 point up to FOUR days late. No points will be given for submissions more than FOUR days late.
- Additionally, no written work will be accepted for grading after 5 pm PT on the last day of classes.

Course Schedule

Week	Topic	Readings and Assignments	Deliverables / Due Dates
Module 1: Guiding Principles			
Week 1 *	MON – Welcome/Introduction		
(23 – 27 Aug)	WED – Mental Maps	HA # 1	
	FRI – Maps in the Social Sciences		

Week	Topic	Readings and Assignments	Deliverables / Due Dates
Module 2: Geometry of the Sphere			
Week 2	MON – Earth Coordinate Systems	Arlinghaus & Kerski, Chapter 1	HA # 1 Due 8/30 at 10 AM PT
(30 Aug - 3 Sep)	WED – Introduction to Homework #2	HA # 2	
	FRI – Earth Systems; Precision of Latitude and Longitude		
Module 3: Location, Trigonometry, and Measurement of the Sphere			
Week 3	<i>*MON – no class (University Holiday)</i>	HA # 3a and/or #3b	HA # 2 Due 9/6 at 10 AM PT
(6* – 10 Sep)	WED – Location/Measurement and Shape of the Earth	Arlinghaus & Kerski, Chapter 2	
	FRI – Measuring the Earth and Other Common Coordinate Systems and Introduction to Homework #3	Kerski, Chapter 2	
Week 4	MON – Trigonometry	Arlinghaus & Kerski, Chapter 3	HA3 - Due 9/13 at 10 AM PT
(13- 17 Sep)	WED – Partitions & Point:Line:Area Transformations	HA # 4	
	FRI – Raster/Vector mapping, Know Your File Formats & Home Assignment # 4		
Module 4: Transformations: Analysis and Raster/Vector Formats			
Week 5*	MON – Cartography and Geovisualization – Part 1	Arlinghaus & Kerski, Chapter 4	HA4 - Due 9/20 at 10 AM PT
(20 - 24 Sep)	WED – Cartography and Geovisualization – Part 2	HA # 5	
	FRI – Cartography and Geovisualization – Home Assignment # 5		
Module 5: Replication of Results: Color and Number			
Week 6	MON – Color (Color straws, Voxels, ramps, transformations)	Arlinghaus & Kerski, Chapter 5	HA5 - Due 9/27 at 10 AM PT
(27 Sep – 1 Oct)	WED – Scale and scale change		
	FRI – Dot Density (Part 1)		

Week	Topic	Readings and Assignments	Deliverables / Due Dates
Module 7: Partitioning of Data: Classification and Analysis			
Week 7	MON – Dot Density (Part 2) & Choice of Data Ranges/Normalization, Home Assignment # 6	Arlinghaus & Kerski, Chapter 6 HA # 6	
(4 – 8 Oct)	WED – Mid-term Review		
	FRI – Mid-term Examination		
Module 8: Visualizing Hierarchies			
Week 8	MON - Isolines / Contour Lines and Final Project	Arlinghaus & Kerski, Chapter 7 HA # 7	HA6 – Due 10/11 at 10 AM PT
(11 – 15* Oct)	WED – Traditional Hierarchies & Intro to Home Assignment # 7		
	*FRI – No class – (university holiday)		
Module 9: Map Projections (2 weeks – Week 9 and 10)			
Week 9	MON – Looking at Projections	Arlinghaus & Kerski, Chapter 9 HA # 8	HA7 – Due 10/18 at 10 AM PT
(18 – 22 Oct)	WED – Sampling Projection Distortion & Intro to Home Assignment #8		
	FRI – Projections 1		
Week 10	MON – Modern Projections 2	HA # 9	HA 8 – Due 10/25 at 10 AM PT
(25 – 29 Oct)	WED – Modern Projections 3		
	FRI – Intro to Home Assignment #9		
Module 10: Distribution of Data / More Cartography			
Week 11	MON – Modern Projections 3	Arlinghaus & Kerski, Chapter 8 HA # 10	HA 9 – Due 11/1 at 10 AM PT
(1 – 5 Nov)	WED – Ann Arbor Tornado Siren Project		
	FRI – Intro to Home Assignment #10		

Week	Topic	Readings and Assignments	Deliverables / Due Dates
Module 11: Past, Present, and Future Approaches			
Week 12	MON – More Cartography	Arlinghaus & Kerski, Chapter 10	HA10 – Due 11/8 at 10 AM PT
(8 – 12 Nov)	WED – From Classics to Modern		
	FRI – A non-Euclidean future?		
Finishing the Drill			
Week 13	MON – Class Discussion	Readings are posted on Blackboard	
(15 – 19 Nov)	WED – Class Discussion		
	FRI – Case Studies		
Week 14	MON – Case Studies	Readings are posted on Blackboard	
(22 - 23 Nov)	WED - no class (University Holidays)		
	*FRI – no class (University Holidays)		
Week 15	MON – Project Presentation		
(29 Nov – 3 Dec)	WED – Project Presentation		
	FRI – Wrap Up & Final Exam Review		Final Project Report: No later than 5:00 PM PT on Friday, 12/3
Final Exam	Closed book exam (TBA)		

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 <https://policy.usc.edu/files/2020/07/SCampus-Part-B-1.pdf>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems

Counseling and Mental Health – (213) 740-9355 – 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

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) 740-9355(WELL), press “0” after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) – (213) 740-5086 | *Title IX Compliance* – (213) 821-8298
equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment – (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, 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.

USC Campus Support and Intervention – (213) 821-4710
campussupport.usc.edu

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

Emergency assistance and avenue to report a crime. Latest updates regarding safety, 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.