

**SSCI 135g, Maps in the Digital World****Syllabus****Units:** 4

**Term — Day — Time:** Fall, 2020, Lectures: MWF 11:00 AM - 12:20 PM. This course is planned to be delivered in a hybrid format. When Los Angeles County/USC authorizes teaching on campus, one meeting per week will be held hybrid/in person, and the others will be held online. All meetings will be streamed for remote access for maximum options and accessibility.

**Location:** KSH 201 (if/when taught residentially on an announced day of the week) / Online via Zoom when not taught residentially at:

<https://usc.zoom.us/j/93403205679?pwd=NzFwWlBtdy8yMGNRYXQ1NkpaM2Qvdz09>

**Instructor:** COL [R] Steven D. Fleming, Ph.D.

**Office:** AHF B55

**Office Hours:** Tuesdays; 8-9 AM and Thursdays; 9-10 AM at: <https://usc.zoom.us/j/2033177375>. NOTE: Students will need to inform me in advance that they desire to meet during these office hours. Additionally, I am always available asynchronously via email and synchronously via phone on most days and times *by prior arrangement* via email.

**Contact Info:** [s.fleming@usc.edu](mailto:s.fleming@usc.edu), 213-740-714

**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](mailto:arutkows@usc.edu), 213-740-6390 (office), <http://bit.ly/andyhangout>

**IT Help:** Richard Tsung

**Office:** AHF B57E

**Office Hours:** By appointment

**Contact Info:** [ctsung@usc.edu](mailto: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](mailto: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.

## 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.

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](http://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*, 3<sup>rd</sup> 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](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 that are 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	16	-	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
<b>Module 1: Guiding Principles</b>			
<b>Week 1</b>	MON -- Welcome/Introduction		
<b>(17-21 Aug)</b>	WED -- Mental Maps	HA # 1	
	FRI -- Maps in the Social Sciences		
<b>Module 2: Geometry of the Sphere</b>			
<b>Week 2</b>	MON -- Earth Coordinate Systems	Arlinghaus & Kerski, Chapter 1	HA # 1
<b>(24-28 Aug)</b>	WED -- Introduction to Homework # 2		Due 8/26 at 9 AM
	FRI -- Earth Systems; Precision of Latitude and Longitude		HA # 2
<b>Module 3: Location, Trigonometry, and Measurement of the Sphere</b>			
<b>Week 3</b>	MON -- Location/Measurement and Shape of the Earth	Arlinghaus & Kerski, Chapter 2	HA # 2
<b>(31 Aug-4 Sept)</b>	WED -- Measuring the Earth and Other Common Coordinate Systems.		Due 9/2 at 9 AM
	FRI -- Trigonometry and Introduction to Homework # 3		HA # 3a and/or #3b

<b>Week</b>	<b>Topic</b>	<b>Readings and Assignments</b>	<b>Deliverables/Due Dates</b>
<b>Module 4: Transformations: Analysis and Raster/Vector Formats</b>			
<b>Week 4</b>	MON – No Class		
<b>(8-11 Sept) (Labor Day – 7/11)</b>	WED – Partitions & Point:Line:Area Transformations	Arlinghaus & Kerski, Chapter 3	HA3 - Due 9/9 at 9 AM
	FRI – Raster/Vector mapping, Know Your File Formats & Home Assignment # 4	HA # 4	
<b>Module 5: Replication of Results: Color and Number</b>			
<b>Week 5</b>	MON – Cartography and Geovisualization – Part 1		
<b>(14-18 Sept)</b>	WED - Cartography and Geovisualization – Part 2	Arlinghaus & Kerski, Chapter 4	HA4 - Due 9/16 at 9 AM
	FRI – Color (Color straws, Voxels, ramps, transformations) & Home Assignment # 5	HA # 5	
<b>Module 6: Scale</b>			
<b>Week 6</b>	MON - Scale and scale change		
<b>(21-25 Sept)</b>	WED – Dot Density (Part 1)	Arlinghaus & Kerski, Part of Chapter 5	
	FRI – Mid-term Review and Home Assignment # 5 Completion		HA5 - Due 9/25 at 11:59 PM
<b>Module 7: Partitioning of Data: Classification and Analysis</b>			
<b>Week 7</b>	MON – Mid-term Examination		Mid-term Exam
<b>(28 Sept-2 Oct)</b>	WED – Dot Density (Part 2) & Choice of Data Ranges/Normalization	Arlinghaus & Kerski, Chapter 6	
	FRI – Isolines / Contour Lines, Home Assignment # 6, and Final Project	HA # 6	

Week	Topic	Readings and Assignments	Deliverables/Due Dates
<b>Module 8: Visualizing Hierarchies</b>			
<b>Week 8</b>	MON - Traditional Hierarchies		
<b>(5-9 Oct)</b>	WED - Hexagonal Hierarchies	Arlinghaus & Kerski, Chapter 7	HA6 - Due
	FRI – Intro to Home Assignment # 7	HA # 7	
<b>Module 9: Distribution of Data</b>			
<b>Week 9</b>	MON - Ann Arbor Tornado Siren Project		
<b>(12-16 Oct)</b>	WED - Mean Center and Standard Deviation Ellipse	Arlinghaus & Kerski, Chapter 8	HA7 - Due
	FRI – Intro to Home Assignment # 8	HA # 8	
<b>Module 10: Map Projections (2 weeks)</b>			
<b>Week 10</b>	MON - Looking at Projections		
<b>(19-23 Oct)</b>	WED - Sampling Projection Distortion	Arlinghaus & Kerski, Chapter 9	HA8 - Due
	FRI - Projections 1 and Intro to Home Assignment # 9	HA # 9	
<b>Week 11</b>	MON - Modern Projections 2		
<b>(26-30 Oct)</b>	WED - Modern Projections 3	Arlinghaus & Kerski, Chapter 9	HA9 - Due
	FRI - Intro to Home Assignment # 10		
<b>Module 11: Past, Present, and Future Approaches</b>			
<b>Week 12</b>	MON – From Classics to Modern		
<b>(2-6 Nov)</b>	WED – A non-Euclidean future?	Arlinghaus & Kerski, Chapter 10	HA10 - Due
	FRI – Project Preparation Prep		
<b>Finishing the Drill</b>			
<b>Week 13</b>	MON-WED – Project Presentation		
<b>(9-13 Nov)</b>	FRI – Course Wrap-up & Exam Review	Text and Notes	Final Project Report – T/I due on last day of class
<b>Final Exam Week</b>	WED - 18 Nov (11 AM – 1 PM)		Final Exam

## 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](http://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](http://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](http://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](http://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](http://equity.usc.edu), [titleix.usc.edu](http://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 that may be specified in applicable laws and governmental regulations.

*Bias Assessment Response and Support – (213) 740-2421*

[studentaffairs.usc.edu/bias-assessment-response-support](http://studentaffairs.usc.edu/bias-assessment-response-support)

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](http://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/sssa](http://studentaffairs.usc.edu/sssa)

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](http://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](http://dps.usc.edu), [emergency.usc.edu](http://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](http://dps.usc.edu) Non-emergency assistance or information.

