

## **SSCI 135g, Maps in the Digital World**

### *Syllabus*

**Units:** 4

**Term — Day — Time:** Fall, 2019, Lectures: Mondays, Wednesdays, and Fridays 11:00 a.m.-12:20 p.m.

**Location:** Montgomery Ross Fisher (MRF) 206

**Instructor:** Su Jin Lee, Ph.D., GISP

**Office:** AHF B55K

**Office Hours:** Mondays 1:00-2:00 p.m. and Wednesdays 2:00-3:00 p.m. Also available most days and times by appointment via email.

**Contact Info:** [sujinlee@usc.edu](mailto:sujinlee@usc.edu), 213-740-2845 (office)

**Instructor:** Steven Fleming, Ph.D.

**Office:** AHF B57G

**Office Hours:** Mondays 8:15-9:15 a.m. and Fridays 8:15-9:15 a.m. Also available most days and times by appointment via email.

**Contact Info:** [s.fleming@usc.edu](mailto:s.fleming@usc.edu), 213-740-7144 (office)

**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

## Course Structure

The course will be organized around the following 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:

*Homework – 4 worth a total of 52 points.* In addition to lectures and in-class discussions, there are a series of homework 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. Weekly homework assignments will be graded and returned, and the mid-term and final exams will have a homework component to them. In other words, the homework component is an important and integral part of the course as a whole.

- Homework #0: Mental Maps
- Homework #1: Routes, Coordinates, Precision and Accuracy
- Homework #2: Measuring the Circumference of the Earth
- Homework #3: Measuring Positions on the Earth's Surface
- Homework #4: Transformations and Raster/Vector Analysis
- Homework #5: Role of Color and Image Interpretation
- Homework #6: Role of Scale and Dot Density Maps

- Homework #7: Classification and Normalization of Data (P)
- Homework #8: Role of Traditional and Hexagonal Hierarchies
- Homework #9: Examining the Distribution of Tornado Data
- Homework #10: Calculating Mean Centers and Standard Derivational Ellipses
- Homework #11: Comparing Map Projections
- Homework #12: Network Analysis

*Mid-term Examination – 1 worth 13 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 10 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 25 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
Homework	13	4	52
Mid-term Examination	1	13	13
Final Project	1	10	10
Final Examination	1	25	25
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 2 points up to FOUR days late. No points will be given for submissions more than FOUR days late. Note that all assignments worth 4 points will receive 0 points if submitted late.
- Additionally, no written work will be accepted for grading after 5 pm PT on the last day of classes.

## Course Schedule

	Topic	Readings and Assignments	Deliverables/Due Dates
Module 1: Guiding Principles			
<b>Week 1</b> 8/26	Introduction		
8/28	Mental Maps	Homework #0	
8/30	Maps in the Social Sciences		
Module 2: Geometry of the Sphere			
<b>Week 2*</b> 9/2	*9/2, Labor Day, university holiday		
9/4	Earth Coordinate Systems	Arlinghaus & Kerski, Chapter 1 Homework #1	Homework #0: Wednesday, 9/4
9/6	Introduction to Homework #1		
<b>Week 3</b> 9/9	Earth Systems; Precision of Latitude and Longitude		
Module 3: Location, Trigonometry, and Measurement of the Sphere			
9/11	Location and measurement; Triangulation; Shape of the Earth	Arlinghaus & Kerski, Chapter 2 Homework #2 Homework #3	Homework #1: Wednesday, 9/11
9/13	Measuring the Earth; Other common coordinate systems; Introduction to Homework #2		
<b>Week 4</b> 9/16	Trigonometry; Introduction to Homework #3		
Module 4: Transformations: Analysis and Raster/Vector Formats			
9/18	Transformation	Arlinghaus & Kerski, Chapter 3 Homework #4	
9/20	Partitions: Point–line–area transformations		
<b>Week 5</b> 9/23	Raster and vector mapping: Know your file formats		Homework #2: Monday, 9/23
9/25	Scope, purpose and choice of final project		
9/27	Introduction to Homework #4		Homework #3: Friday, 9/27
Module 5: Replication of Results: Color and Number			
<b>Week 6</b> 9/30	Color straws, voxels & ramps	Arlinghaus & Kerski, Chapter 4 Homework #5	
10/2	Image Transformations		
10/4	Introduction to Homework #5		Homework #4p: Friday, 10/4

	Topic	Readings and Assignments	Deliverables/Due Dates
Module 6: Scale			
<b>Week 7</b> 10/7	Scale and scale change	Arlinghaus & Kerski, Chapter 5 Homework #6	
10/9	Dot density maps		
10/11	Mid-term review		Homework #5: Friday, 10/11
<b>Week 8</b> 10/14	Mid-term Examination		Mid-term Examination: Monday, 10/14
10/16	Introduction to Homework #6		
10/18*	* 10/17-18, Fall recess		
Module 7: Partitioning of Data: Classification and Analysis			
<b>Week 9</b> 10/21	Choice of Data Ranges Normalizing Data	Arlinghaus & Kerski, Chapter 6 Homework #7	
10/23	Isolines and contours Introduction to Homework #7		Homework #6: Wednesday, 10/23
Module 8: Visualizing Hierarchies			
10/25	Traditional Hierarchies		
<b>Week 10</b> 10/28	Hexagonal Hierarchies	Arlinghaus & Kerski, Chapter 7 Homework #8	
10/30	Introduction to Homework #8		Homework #7p: Wednesday, 10/30
Module 9: Distribution of Data			
11/1	Ann Arbor Tornado Siren Project	Arlinghaus & Kerski, Chapter 8 Homework #9 Homework #10	
<b>Week 11</b> 11/4	Mean Center and Standard Deviational Ellipse		
11/6	Introduction to Homework #9		Homework #8p: Wednesday, 11/6
11/8	Introduction to Homework #10		
Module 10: Map Projections			
<b>Week 12</b> 11/11	Looking at Projections	Arlinghaus & Kerski, Chapter 9 Homework #11 Homework #12	
11/13	Sampling Projection Distortion		
11/15	More Projections		
<b>Week 13</b> 11/18	Modern Projections		

	Topic	Readings and Assignments	Deliverables/Due Dates
11/20	Introduction to Homework #11		Homework #9: Wednesday, 11/20
11/22	Introduction to Homework #12		Homework #10: Friday, 11/22
Module 11: Past, Present, and Future Approaches			
<b>Week 14</b> 11/25	From classics to the modern	Arlinghaus & Kerski, Chapter 10	Homework #11p: Monday, 11/25
11/27	*11/27-12/1, Thanksgiving recess		
11/29			
<b>Week 15</b> 12/2	A non-Euclidean future?		Homework #12: Monday, 12/2
12/4	Final Project		
12/6 *Friday, 12/6 is last day of class	Class Review / Wrap Up		Final Project Report: No later than 5:00 pm PT on Friday, 12/6
<b>Final Exam Week</b>		Final Examination	Final Examination: Wednesday, 12/11

## 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 which 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/ssa](http://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](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.