

SSCI 135g, Maps in the Digital World

Syllabus

Units: 4

Term Day Time: Spring, 2020, Lectures: Mondays, Wednesdays, and Fridays 10:00-11:20a.m.

Location: Grace Ford Sallvatori Hall (GFS) 220

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

Office: AHF B55K

Office Hours: Mondays 12:00-1:00 p.m. and Wednesdays 12:30-1:30 p.m. Also available most days and times by appointment via email.

Contact Info: sujinlee@usc.edu, 213-740-2845 (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, 213-740-6390 (office), <http://bit.ly/andyhangout>

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Office: AHF B57E

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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 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 because maps are now a pervasive part of our everyday lives.

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.
- 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:

Homework – 12 worth a total of 52 points. In addition to lecture and in-class discussions, there is a series of homework 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. 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. The following are the homework topics:

- 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: Site Suitability Analysis
- Homework #7: Route to Prospective Sites
- Homework #8: Classification and Normalization of Data (Visualization)
- Homework #9: Analyzing crime incidents
- Homework #10: Examining the Distribution of Tornado Data
- Homework #11: Calculating Mean Centers and Standard Derivational Ellipses
- Homework #12: Comparing Map Projections

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.

Schedule

	Topic	Readings and Assignments	Deliverables/Due Dates
Module 1: Guiding Principles			
Week 1 1/13	Introduction		
1/15	Mental Maps	Homework #0	
1/17	Maps in the Social Sciences		
Module 2: Geometry of the Sphere			
Week 2* 1/20	*Monday, 1/20 is university holiday		
1/22	Earth Coordinate Systems	Arlinghaus & Kerski, Chapter 1 Homework #1	Homework #0: Wednesday, 1/22
1/24	Earth Systems; Precision of Latitude and Longitude		
Week 3 1/27	Introduction to Homework #1		
Module 3: Location, Trigonometry, and Measurement of the Sphere			
1/29	Location and Measurement; Triangulation; Shape of the Earth	Arlinghaus & Kerski, Chapter 2 Homework #2 Homework #3	
1/31	Measuring the Earth; Other Common Coordinate Systems		Homework #1: Friday, 1/31
Week 4 2/3	Trigonometry Introduction to Homework #2		
2/5	Introduction to Homework #3		
Module 4: Transformations: Analysis and Raster/Vector Formats			
2/7	Transformation	Arlinghaus & Kerski, Chapter 3 Homework #4	
Week 5 2/10	Partitions: Point–Line–Area Transformations		Homework #2: Monday, 2/10
2/12	Raster and Vector Mapping		
2/14	ArcGIS Online		Homework #3: Friday, 2/14
Module 5: Replication of Results: Color and Number			
Week 6 2/17	*Monday, 2/17 is university holiday		
2/19	Color Straws, Voxels & Ramps	Arlinghaus & Kerski, Chapter 4	

	Topic	Readings and Assignments	Deliverables/Due Dates
2/21	Image Transformations Mid-Term Review	Homework #5	
Week 7 2/24	Mid-Term Examination		Mid-term Examination: Monday, 2/24
2/26	Introduction to Homework #4		
2/28	Introduction to Homework #5		
Module 6: Scale			
Week 8 3/2	Scale and Scale Change	Arlinghaus & Kerski, Chapter 5 Homework #6	
3/4	Dot Density Maps		Homework #4: Wednesday, 3/4
3/6	Introduction to Homework #6		Homework #5: Friday, 3/6
Module 7: Partitioning of Data: Classification and Analysis			
Week 9 3/9	Choice of Data Ranges Normalizing Data	Arlinghaus & Kerski, Chapter 6 Homework #7	
3/11	Isolines and Contours Introduction to Homework #7		
3/13	The Final Project		Homework #6: Friday, 3/13
3/16	*3/16-3/22 is Spring Recess		
Module 8: Visualizing Hierarchies			
Week 10 3/23	Hierarchies: Census Data	Arlinghaus & Kerski, Chapter 7 Homework #8	
3/25	Traditional Hierarchies Hexagonal Hierarchies		Homework #7: Wednesday, 3/25
3/27	Introduction to Homework #8		
Week 11 3/30	Characteristics of Population		
Module 9: Distribution of Data			
4/1	Ann Arbor Tornado Siren Project		
4/3	Mean Center and Standard Deviational Ellipse		Homework #8: Friday, 4/3
Week 12 4/6	Introduction to Homework #9		
4/8	Introduction to Homework #10		

	Topic	Readings and Assignments	Deliverables/Due Dates
Module 10: Map Projections			
4/10	Looking at Projections	Arlinghaus & Kerski, Chapter 9 Homework #11 Homework #12	
Week 13 4/13	Sampling Projection Distortion		Homework #9: Monday, 4/13
4/15	Modern Projections		Homework #10: Wednesday, 4/15
4/17	Introduction to Homework #11		
Week 14 4/20	Introduction to Homework #12		
Module 11: Past, Present, and Future Approaches			
4/22	From Classics to The Modern	Arlinghaus & Kerski, Chapter 10	Homework #11: Wednesday, 4/22
4/24	A Non-Euclidean Future?		Homework #12: Friday, 4/24
Week 15 4/27	Class Review		
4/29	Final Project		
5/1 *Friday, 5/1 is last day of class	Wrap Up		Final Project Report: No later than 5:00 pm PT on Friday, 5/1
Final Exam Week		Final Examination	Final Examination: Monday, 5/11, 8-10 a.m.

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, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

studenthealth.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

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 and 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 – (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. 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. The university also prohibits sexual assault, non-consensual sexual contact, sexual misconduct, intimate partner violence, stalking, malicious dissuasion, retaliation, and violation of interim measures.

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.