

SSCI 135 (35619R), Maps in the Digital World

Syllabus

Units: 4

Term Day Time: Fall 2025, M,W, and F from 9:00-9:50am

Location: DMC 150

Discussion Sections:

35661R: Tuesday, 10:00-10:50, MHP 102

35662R: Thursday, 1:00-1:50, WPH 101

Instructor: Katherine Lester, PhD

Office: AHF B55A

Regular Office Hours: Mon and Wed 2:30-3:30 pm PT. Also available most days and times by appointment via email.

Contact Info: lesterk@usc.edu, 213-821-0672

Teaching Assistant: TBA

Office: AHF B56A

Regular Office Hours: TBA

Contact Info: TBA

Library Help: Andy Rutkowski

Office: LIPA B40-A

Office Hours: Thu 10 am-12 pm

Contact Info: arutkows@usc.edu, see contact page on Brightspace for Zoom Room

IT Help: Spatial Support

Contact Info: spatial_support@usc.edu

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 contemporary world. The lectures and accompanying homework assignments will focus on the role of maps in contemporary 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 maps and mapping in 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 the assumptions and implications for the logical structures embedded in various kinds of maps.
- Identify both useful and specific applications of various kinds of maps.

Students may vary in their competency levels on these abilities. You can expect to acquire these abilities only if you honor all course policies, attend classes regularly, complete all assigned work in good faith and on time, and meet all other course expectations of you as a student.

Prerequisite(s): None

Co-Requisite(s): None

Last Revised on 3/10/25

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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)

COVID-19 policy -- Students are expected to comply with all aspects of USC's COVID-19 policy including, but not limited to, vaccination, indoor mask mandate, and daily TrojanCheck. Failure to do so may result in removal from the class and referral to Student Judicial Affairs and Community Standards. Students are recommended to keep safe physical distancing, whenever possible, to prevent any possible transmission. Please contact your instructor if you have any safety concerns.

Diversity and Inclusion – It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful to everyone, and you are also expected to respect of others regardless of their race, ethnicity, gender identity and expressions, cultural beliefs, religion, sexual orientation, national origin, age, abilities, ideas and perspectives, or socioeconomic status. Your suggestions are encouraged and appreciated. Feel free to let me know ways to improve the effectiveness of the course for you personally or for other students.

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://keep-teaching.usc.edu/students/student-toolkit/>

Brightspace – This course will utilize the Brightspace learning management system which allows students to access course content, upload assignments, participate in discussion forms, among other learning experiences. The Brightspace platform provides flexibility in the learning experience where students can participate in the course residentially or remotely, synchronously (meeting together at the same time) or asynchronously (accessing videos and course content outside of class).

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

Communications – All assignments given and all materials to be handed in will be submitted via D2L. The instructor will also create and monitor discussion forums through which students can discuss issues and assignments as needed. Students should read all email sent from Brightspace or from course instructor(s) as soon as possible. Also, students who do not regularly use their USC email accounts should double-check to be sure that mail sent from both the Brightspace accounts and the instructor's account (noted above) to your USC account is forwarded to an address used regularly and does not go into junk mail. The instructor will endeavor to respond to all email within 24 hours of receipt, aiming for no more than 72 hours delay. In the rare case that an instructor is off-line for an extended period of time, an announcement will be posted to the class Brightspace site.

Required Readings and Supplementary Materials

All readings are available on Brightspace organized by week. You do not need to purchase any of these materials.

The required textbook for this course is:

- Arlinghaus, S. L. and J. Kerski. 2014. *Spatial Mathematics: Theory and Practice through Mapping*. Boca Raton, FL: CRC Press.

Other resources for this course include (but are not limited to):

- NASA. "What is Remote Sensing?" Earth Data: Open access for Open Science. Available at: <https://www.earthdata.nasa.gov/learn/backgrounders/remote-sensing>.
- Robinson, A. C. "Spatial is Special." Penn State: College of Earth and Mineral Sciences. Available at: https://www.e-education.psu.edu/maps/l2_p2.html.
- Rothman, J. 2024. "Interactive Unit Circle." GeoGebra. Available at: <https://www.geogebra.org/m/nv9vex3X>.
- "Latitude and Longitude Visualized." 2022. Aviation and STEM Immersive Experiences. Available at: <https://famousandfaded.com/showcase/latitude-longitude-visualised/>.

Description and Assessment of Assignments

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

Homework Assignments – 10 worth 4 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. The homework is an important and integral part of the course as a whole. Homework assignments include:

1. Mental Maps
2. Wild Maps
3. Routes and Coordinates
4. Exploring Distance
5. Playing with Projections
6. Choosing Symbology
7. Build a Map
8. Exploring GNSS
9. Current Events in Remote Sensing
10. Centrography

Grading Breakdown

Assessment	Number	Points Each	Total Points
Homework Assignments	10	5	50
Discussion Session Activities	13	2	26
Midterm Examination	1	12	12
Final Exam	1	12	12
Total	25	-	100

Grading Scale

Assignments in this and other SSCI courses, are graded on the letter grade scale where A is exemplary, B is very good, C is satisfactory, D is unsatisfactory, and F needs improvement. Final grades use the same letter grade scale. The grading scale follows:

A	> 93 points		B-	80-82 points		D+	67-69 points
A-	90-92 points		C+	77-79 points		D	63-66 points
B+	87-89 points		C	73-76 points		D-	60-62 points
B	83-86 points		C-	70-72 points		F	<60 points

Assignment Submission and other Policies

Assignments must be submitted via Brightspace by the due dates specified in the Course Schedule. Attention to on-time assignment submission is essential. The instructor will aim to return feedback before the next assignment is due. Strict penalties apply for late assignments as follows:

- Assignments up to four-days late will receive a 1-point deduction per day. No assignments submitted after four days will be accepted or graded.
- Additionally, no written work will be accepted for grading after 5 pm PT on the last day of classes.
- Absences from class sessions must be requested by sending an email to the instructor. Excused absences from class sessions will be granted only for valid reasons; please notify me of the reason for your absence in your email

Grading Timeline

My goal is to provide grading and feedback on each course assignment no later than one week after the assignment was submitted.

Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is prohibited. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which has been distributed to students or in any way has been displayed for use in relationship to the class, whether obtained in class, via

email, on the internet, or via any other media. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Learning Experience Evaluations

Please note Learning Experience Evaluations for the course take place at the end of the semester and are facilitated by the University. These evaluations provide an important review of student experiences in the course.

Course Schedule

Week	Lecture Topic	Discussion	Readings/Due Dates
Module 1: Introducing Spatial Sciences			
Week 1 (8/25-8/29)	Monday: Welcome to Spatial Sciences!	Mental Maps	<i>Spatial is Special</i> , Penn State <i>Map Reading</i> , Buckley and Kimerling <i>7 Tips to Achieve Academic Success</i> , Penn online
	Wednesday: Why Maps?		
	Friday: Reading Maps		
Module 2: The 3-Dimensional Globe			
Week 2 (9/1-9/5)	* Monday: Labor Day-no class	Pathfinding	HW #1: Mental Maps Due 9/5 <i>Geometry of the Sphere</i> , Arlinghaus and Kerski
	Wednesday: Shape of the Earth		
	Friday: Location and Direction		
Week 3 (9/8-9/12)	Monday: Latitude	DMS	HW #2: Wild Maps Due 9/12 <i>Latitude and Longitude Visualized</i> <i>Interactive Unit Circle</i> <i>Antipodes Map</i>
	Wednesday: Longitude		
	Friday: Seasons		
Week 4 (9/15-9/19)	Monday: Building a Model of Earth	Calculating Circumference of Earth	HW #3: Routes and Coordinates Due 9/19 <i>Location, Trigonometry, and</i> <i>Measurement of the Sphere</i> , Arlinghaus and Kerski
	Wednesday: Antipodes and DMS review		
	Friday: Other Coordinate Systems		
Module 3: The 2-Dimensional Map			
Week 5 (9/22-9/26)	Monday: Intro to Map Projections	Map Projections	HW #4: Distance Due 9/26 <i>Map Projections</i> , Arlinghaus and Kerski
	Wednesday: The Two Families		
	Friday: Choosing a Projection		

Week	Lecture Topic	Discussion	Readings/Due Dates
Week 6 (9/29-10/3)	Monday: Theory of Scale	Fractions, Algebra, and Scale	HW #5: Choosing Projections Due 10/3 <i>Scale, Arlinghaus and Kerski</i>
	Wednesday: Cartographic Scale		
	Friday: Representative Fractions		
Week 7 (10/6-10/10)	Monday: Midterm Review	None	Midterm 10/8 @ 10:00
	Wednesday: Midterm Exam		
	*Friday: Fall Recess-No Class		
Module 4: Making Useful Maps			
Week 8 (10/13-10/17)	Monday: Intro to GIS	Getting Started with GIS *Bring your laptop!	<i>ArcGIS Online, Kne</i>
	Wednesday: Data Models		
	Friday: GIS Applications and A Pitch for Geospatial		
Week 9 (10/20-10/24)	Monday: Intro to Cartography	Isolines	HW #6: Symbology Due 10/24 <i>Narrative and Storytelling, Kelly Common Thematic Map Types, Golebiowska and Slomska-Przech Color Theory, Christophe</i>
	Wednesday: Types of Maps		
	Friday: Color		
Week 10 (10/27-10/31)	Monday: Building a Choropleth Map	Classification	HW #7: Build a Map Due 10/31 <i>A Choropleth Map Case Study, Lobben and Limpisathian Statistical Mapping, Foster</i>
	Wednesday: Classification		
	Friday: Ugly Maps		
Module 5: From a Distance-GNSS and Remote Sensing			
Week 11 (11/3-11/7)	Monday: GNSS 1	Speed and Remote Sensing	HW #8: GNSS Due 11/7 <i>Satellite Navigation-How it Works, FAA What is Remote Sensing?, NASA Light Detection and Ranging, Keranen and Kolvoord</i>
	Wednesday: GNSS 2		
	Friday: Remote Sensing		
Week 12 (11/10-11/14)	*Monday: University Holiday, No Class	NDVI and Charts	HW #9: Remote Sensing Due 11/14 <i>What is NDVI?, GISgeography.com GIS&T and Archaeology, Keen</i>
	Wednesday: Remote Sensing Applications		
	Friday: Space Archaeology		
Module 6: Spatial Patterns			
Week 13 (11/17-11/21)	Monday: Central Tendency	Means, Medians, and Standard Deviation	HW #10: Centrography Due 11/21 <i>Distribution of Data, Arlinghaus and Kerski</i>
	Wednesday: Spatial Distribution		
	Friday: Spatial Analysis		

Week	Lecture Topic	Discussion	Readings/Due Dates
Week 14 (11/24-11/28)	Monday: Clustering	None	<i>GIS&T and Public Health, Shi</i>
	*Wednesday: Thanksgiving Break		
	*Friday: Thanksgiving Break		
Week 15 (12/1-12/5)	Monday: Geoenrichment and Overlay	Site Selection	<i>Overlay, Cai</i> <i>Utilizing GIS in Site Selection, Quest</i> <i>Site Solutions</i>
	Wednesday: Site Selection		
	Friday: Wrap Up and Final Review		
Final Exam – December 15 @ 11:00am			

Statement on Academic Conduct and Support Systems

Academic Integrity

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, comprises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see [the student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

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

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

988 Suicide and Crisis Lifeline - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086

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

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101

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

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) 442-1200 – 24/7 on call

Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-2850 or otfp@med.usc.edu

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.

Resources for Online Students

The Course D2L page and the SSI Student Hub on D2L 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.