USC Dornsife
Dana and David Dornsife
College of Letters, Arts and Sciences
Spatial Sciences Institute

SSCI 589, Cartography & Visualization

Syllabus

Units: 4

Term — Day — Time: Spring, 2020, Online

Location: Online

Instructor: Katsuhiko "Kirk" Oda, Ph.D., GISP
Office: AHF B56B
Regular Office Hours: Wednesdays 1:00 to 2:00 p.m. and Fridays 10:00 to 11:00 a.m. PT. Also available most days and times by appointment via email.
Contact Info: katsuhio@usc.edu, 213-740-2868 (office), https://bluejeans.com/2137402868 (Bluejeans).

Library Help: Andy Rutkowski
Office: VKC 36B
Office Hours: Tuesdays 10:00 a.m. to 12:00 p.m. PT and Thursdays 4:30 to 5:30 p.m. PT
Contact Info: arutkows@usc.edu, 213-740-6390, http://bit.ly/andyhangout

IT Help: Richard Tsung
Office: AHF B55
Office Hours: By appointment
Contact Info: ctsung@usc.edu, 213-821-4415 (office)

Course Scope and Purpose

This course is designed to cover concepts and methods for mapping and visualizing geospatial phenomena. It is an elective course for six distance learning programs (the M.S. in Geographic Information Science & Technology (GIST), the M.S. in Human Security and Geospatial Intelligence, the GIST, Geospatial Intelligence, and Geospatial Leadership Graduate Certificates, and the GeoHealth track in the Keck School of Medicine's Master of Public Health program) and one residential program (the M.S. in Spatial Data Science).

This is an important course for anyone who uses maps and other visual products to support spatial analysis or spatial data collection workflows and who wish to first learn the underlying concepts and skills. In this course, you will gain an understanding of theories for making print and web maps through optimal design decisions, the evolving role of maps in communication, and the ways in which various forms of spatial representation and visualization can be performed using Esri's ArcGIS ecosystem. We will cover six major topics:

- Cartographic fundamentals – Symbolization, visual variables, classification, scale and generalization, and effective design (layout, color, and typography).
- Mapping discrete features – Reference and thematic maps; and within the latter, the four basic subtypes of feature symbolization: choropleth, proportional symbol, dot density, and flow maps.
- Treatment of continuous surfaces – Isarithmic analysis and terrain representation, including contour lines and hill-shading.
- Web map design – The unique properties of web mapping, techniques for editing vector tiles, handling for multi-scale mapping, and controlling symbolization through smart mapping and an expression language, and theories underlying the properties and techniques.
- Geovisualization – Spatiotemporal and 3D visualization.
- Cartography projects for communication – Planning and implementing a cartography project and emphasizing cartographic thinking and communication for a wide range of purposes, including communication about research.

The workplace expectations for today's GIST professionals include the ability to learn continuously, work with many different kinds of data and with professionals in other disciplines, domains, and agencies. There are many unique and deep skill sets needed in today's world. However, they do not standalone; the ability to collaborate, to learn from others, and to expand opportunities jointly are required in today's workplace and mean that the collaborative component of this course is essential.

This is a graduate level course, so you should expect this class to be intellectually challenging. As graduate students you are expected to engage with the information you are learning and to explore the heady cauldron of ideas, opinion, and analysis that describe our collective effort to thoroughly interrogate the subject at hand. Learning

arises from active engagement with the knowledge found in our reading materials and with one another. As in any graduate class, the instructor's role is that of a guide who keeps you on this path of discovery and you will find that you will learn much from your fellow classmates. This is especially the case within the milieu of "online learning."

Learning Objectives

This is a practical, "hands-on" course; when you have completed it, you will be able to:

- Develop and apply actionable knowledge of cartography and geovisualization
- Design and construct professional and aesthetically pleasing maps for communicating map information to others
- Make base information that displays geographic context through cartographic principles
- Choose and control map elements, visual variables, labels, and colors for better cartographic communication
- Utilize a variety of thematic mapping and geovisualization techniques for best effect
- Design and construct web maps by exploiting the characteristics of web mapping and combining appropriate web mapping techniques
- Plan a cartography project and develop a professional-level map of varying purpose

Prerequisite(s): None
Co-Requisite (s): None
Concurrent Enrollment: None
Recommended Preparation: SSCI 581: Concepts for Spatial Thinking

Technological and Communication Requirements

ArcGIS is provided online via the SSI 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 SSI Server

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 – This is a distance learning course, so most of our interactions will be asynchronous (not at the same time). All materials to be handed in will be submitted via Blackboard. It is each student's responsibility to stay informed about what is going on in our course. In addition to email about time-sensitive topics, any important announcements will be posted on the Announcement page in Blackboard. Be sure to check these each time you log onto Blackboard.

I will send via email through Blackboard any notices that are time sensitive. Please be sure that you read as soon as possible all email sent from Blackboard or from me. Do not ignore course email until the day before assignments are due. Also double check to be sure that email sent from the USC blackboard account does not go into your junk mail!

While I am usually on-line all day and will probably respond to emails from students very quickly, I will endeavor to respond to all email within 24 hours of receipt, aiming for no more than 72 hours delay. In the rare case when I expect to be off-line for more than 72 hours, I will post an announcement on the Blackboard site.

Discussion forums – On the Blackboard site, I will post a series of discussion threads relevant to various sections of the course. Discussions provide a key means for student-to-student discussion and collaboration that can replicate the face-to-face contact you may have experienced in traditional classrooms. Here students can provide support to each other while working on your assignments, sharing hints and helpful tips, as you would in a classroom laboratory. Please post your questions about assignments there, as you would ask them publicly in the classroom. I monitor the discussion threads and offer comments when necessary, but more importantly, consider the discussion board a key way to connect with your classmates and share your discoveries.

Required Readings and Supplementary Materials

Textbooks – There are two texts for this course. We encourage you to obtain the texts early since you will need them from the opening day of class. They are available from the USC Bookstore or online outlets such as Amazon.

- Field, Kenneth. 2018. *Cartography.* (1st edition). Redlands, CA: Esri Press.
- Slocum, Terry A., Robert B. McMaster, Fritz C. Kessler, and Hugh H. Howard. 2009. *Thematic Cartography and Geovisualiztion* (3rd edition). Upper Saddle Creek, NJ: Pearson/Prentice-Hall.

Readings – Additional readings that focus on topics relevant to course themes will be provided through Blackboard. These readings are extracts of the following books.

- Brewer, Cynthia. 2015. *Designing Better Maps: A Guide for GIS Users.* Redlands, CA: Esri Press.

- Buckley, Aileen. 2012. *Designing Great Web Maps.* Redlands, CA: ESRI Mapping Center.
- Çöltekin, Arzu, Ismini-Eleni Lokka, and Martin Zahner. 2016. *On the usability and usefulness of 3D (geo) visualizations--A focus on virtual reality environments.* Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XLI-B2, 387-392, https://doi.org/10.5194/isprs-archives-XLI-B2-387-2016.
- Dent, Borden, Jeff Torguson, and Thomas Hodler. 2008. *Cartography: Thematic Map Design.* New York, NY: McGraw-Hill Education.
- Kraak, Menno-Jan. 2014. *Mapping time: Illustrated by Minard's map of Napoleon's Russsian Campaign of 1812*. Redlands, CA, Esri Press.
- Monmonier, Mark. 2018. *How to Lie with Maps*. Chicago, IL: University of Chicago Press.
- Muehlenhaus, Ian. 2013. *Web Cartography: Map Design for Interactive and Mobile Devices*. The Netherlands, CRC Press.
- Tsou, Ming-Hsiang. 2011. *Revisiting Web Cartography in the United States: the Rise of User-Centered Design,* Cartography and Geographic Information Science, 38:3, 250-257, DOI: 10.1559/15230406382250

Description and Assessment of Assignments

Weekly Assignments

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

Resume Assignment (1%) – The SSI Programs require all current students to post and maintain a public resume, short biography and recent photo on our shared SSI Student Community Blackboard site. Unless you opt out, your photo and resume will be posted to the Spatial Sciences Institute website and your resume will be included in the Spatial Sciences Institute Graduate Programs Resume Book. The latter is compiled annually and, along with our web presence, is used to promote our programs and more importantly, your skills, experience, and professional aspirations.

Quizzes (16%) – Eight quizzes will be administered throughout the semester and will afford each of you the opportunity to demonstrate your knowledge and understanding of weekly themes.

Discussion Forums (12%) – Six discussion forums will focus on varying combinations of theory and practice. For most of these, you are required to post a minimum of one message and two replies to messages posted by your classmates.

Map Exercises 1 – 3, 6 – 8 (36%) – These will be hands-on activities that will allow you to practice the techniques explored in theory in the text. To demonstrate that you have developed your own cartographic and mapping skills, you will turn in a copy of your maps

and/or brief text answers. Please note that most of the exercises are biweekly assignments.

Map Exercises 4 *& 5* (16%) – These map exercises are more substantial than the other tutorials, requiring more thought and effort. You will be asked to review your classmates' maps, provide them with feedback, and submit your revised map based on their comments on your map. These exercises do not provide step-by-step instructions. Rather, you will apply your knowledge and skills for designing and constructing maps. Your work will be assessed through a rubric.

Final Project

The final project (worth 23% of the final grade) will be your opportunity to integrate all that you have learned in the semester by conducting an original mapping project. This mapping project will build upon the various map-making skills that you will develop during the semester. Your task is to construct a map for a display in an exhibition, a series of maps for a scholarly manuscript, or a web map. You will identify a topic, locate data, select a design, and apply your cartographic skills. To help facilitate this work, the final project will be broken up into five distinct components with their own points and deadlines as follows: (1) a written proposal (5 points); (2) an individual meeting (2 points); (3) a draft map (2 point); 4) the final version of your map (12 points); and 5) a peer-review activity (2 points).

Grading Breakdown

Careful planning and a serious, consistent commitment will be required for you to successfully navigate the various deliverables in this and other GIST courses. The table below summarizes the SSCI 589 course assignments and their point distribution:

Assessment	Number	Points Each	Total Points
Weekly Assignments			
Resume Assignment	1	1	1
Quizzes	6	1 - 3	12
Discussion Forums	6	2	12
Map Exercises 1 – 3, 6 – 8	6	6	36
Map Exercises 4 & 5	2	8	16
Project Components			
Proposal	1	5	5
Individual Meeting	1	2	2
Draft Map	1	2	2
Final Map	1	12	12
Peer Review	1	2	2
Total	26	-	100

Assignment Submission Policy

Unless otherwise noted, all assignments are due by 5:00 pm Pacific Time (PT) on Wednesdays and must be submitted via Blackboard. Project components have different due dates as indicated on the Course Schedule below. Your attention to on-time assignment submission is essential if I am to meet my goal to return comments on your submitted assignments before the next one is due. Sometimes this is impossible, so I will post a notice on anticipated delays if needed.

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 2 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.

Workload – This is a four credit, one semester course. Students should expect to spend 10-15 hours per week completing the work in this course.

Schedule

	Topic	Readings and Assignments	Deliverables/Due Dates
Week 1 1/13	**Overview of Map Design**	Slocum et al.: Ch 1 Field (selected pages; 12 pages total) Discussion Forum 1 Resume Assignment	No deliverables
Week 2 1/21* *Monday, 1/20 is university holiday	**Basemaps & Generalization**	Slocum et al.: Ch 6 Brewer: Ch 2 Field (selected pages; 18 pages total) Discussion Forum 2 Map Exercise 1	Resume Assignment: Wednesday, 1/22 Discussion Forum 1: Wednesday, 1/22 Response to Discussion Forum 1: Friday, 1/24
Week 3 1/27	**Terrain Representation**	Slocum et al.: Ch 20 Field (selected pages; 20 pages total) Quiz 1 Map Exercise 2	Discussion Forum 2: Wednesday, 1/29 Map Exercise 1: Wednesday, 1/29 Response to Discussion Forum 2: Friday, 1/31
Week 4 2/3	**Map Elements**	Slocum et al.: Ch 11&12 Field (selected pages; 14 pages total) Quiz 2	Quiz 1: Wednesday, 2/5
Week 5 2/10	**Typography**	Slocum et al.: Ch 11 Field (selected pages; 12 pages total) Quiz 3 Map Exercise 3	Quiz 2: Wednesday, 2/12 Map Exercise 2: Wednesday, 2/12

Week 6 2/18* *Monday, 2/17 is university holiday	**Symbolization**	Slocum et al.: Ch 5 Field (selected pages; 40 pages total) Quiz 4	Quiz 3: Wednesday, 2/19
Week 7 2/24	**Color & Choropleth Mapping**	Slocum et al.: Ch 4&14 Brewer: Ch 8 Field (selected pages; 30 pages total) Quiz 5 Map Exercise 4	Quiz 4: Wednesday, 2/26 Map Exercise 3: Wednesday, 2/26
Week 8 3/2	**Proportional Symbols & Dot Density Mapping**	Slocum et al.: Ch 17 Field (selected pages; 6 pages total) Quiz 6 Map Exercise 5	Quiz 5: Wednesday, 3/4 Map Exercise 4: Wednesday, 3/4 Responses to Map Exercise 4: Friday, 3/6
Week 9 3/9	**Web Cartography**	Tsou (2011) Monmonier: Ch 14 Field (selected pages; 8 pages total) Discussion Forum 3 Map Exercise 6 Final Project: Written Proposal	Quiz 6: Wednesday, 3/11 Map Exercise 5: Wednesday, 3/11 Responses to Map Exercise 5: Friday, 3/13
3/16 *3/16-3/22 is Spring Recess			
Week 10 3/23	**Map Design for Web**	Buckley (2012) Muehlenhaus: Ch 3 Field (selected pages; 8 pages total) Discussion Forum 4	Discussion 3: Wednesday, 3/25 Final Project Written Proposal: Wednesday, 3/25 Responses to Discussion Forum 3: Friday, 3/27 Responses to Final Project Written Proposal: Friday, 3/27 Final Project Individual Meetings (TBD)
Week 11 3/30	**3D Visualization**	Çöltekin (2016) Field (selected pages; 16 pages total) Discussion Forum 5 Map Exercise 7 Final Project: Draft Map	Discussion Forum 4: Wednesday, 4/1 Map Exercise 6: Wednesday, 4/1 Responses to Discussion Forum 4: Friday, 4/3
Week 12 4/6	**Space-time Visualization**	Kraak, Menno-Jan: Ch 5 Field (selected pages; 6 pages total) Discussion Forum 6	Discussion Forum 5: Wednesday, 4/8 Responses to Discussion Forum 5: Friday, 4/10

Week 13 4/13	**Flow Mapping**	Slocum et al.: Ch 19 Field (selected pages; 6 pages total) Map Exercise 8 Final Project: Final Map	Discussion Forum 6: Wednesday, 4/15 Map Exercise 7: Wednesday, 4/15 Final Project Draft Map: Wednesday, 4/15 Responses to Discussion Forum 6: Friday, 4/17
Week 14 4/20	**Cartogram**	Slocum et al.: Ch 19 Dent et al.: Ch 10 Field (selected pages; 6 pages total)	Map Exercise 8: Wednesday, 4/22
Week 15 4/27 Friday, 5/1 is the last day of class	**Wrap-up: Summary of Cartography & Visualization**	Final Project: Final Map	Final Project Map no later than 5pm (PT) on Wednesday, 4/29
Final Exams 5/6-5/13		Final Project: Peer Review	Submit your response to this peer review activity by Wednesday, 5/6

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, http://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
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 – (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.

USC Support and Advocacy – (213) 821-4710
uscsa.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.