

SSCI 589, Cartography & Visualization

Syllabus

Units: 4

Term — Day — Time: Spring, 2017, Online

Location: Online

Instructor: Katsuhiko “Kirk” Oda

Office: AHF B56B

Office Hours: Mon 10 -11 am PT and Wed 2-3 pm PT via Blue Jeans – please contact me via email in advance to ensure I will be online. Also available most days and times by appointment via email.

Contact Info: katsuhio@usc.edu, 213-740-2868 (office), <https://bluejeans.com/2137402868> (Bluejeans).

GIS Librarian Help: Katharin Peter

Office: VKC B40a

Office Hours: By appointment

Contact Info: kpeter@usc.edu, 213-740-1700 (office)

IT Help: Richard Tsung

Office: AHF 146

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 the elective course for both the GIST M.S. as well as the GIST, Geospatial Intelligence, and Geospatial Leadership Graduate Certificate programs, and the GeoHealth track in the Keck School of Medicine's MPH. This is also a good course for those who are considering getting more seriously involved with cartography and visualization and who wish to first learn the underlying concepts and skills. In this course, you will gain an understanding of the fundamentals of cartography, 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 – Map projections, graphic shapes, symbolization, 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.

Advanced cartographic techniques – Cartographic techniques for labeling with Maplex, developing annotation feature classes and symbolizing with feature class representations.

Geovisualization – Spaciotemporal and 3D visualization.

Map Communication – Cartographic thinking and communication.

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 stand alone; 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 maps for communicating map information to others.
- Make base information that provides geographic reference.
- Choose and arrange map elements for better cartographic communication.
- Choose and control labels, symbols and colors for best effect.
- Utilize a variety of thematic mapping and geovisualization techniques.

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 publically 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. It is available from the USC Bookstore or online outlets such as Amazon.

- Slocum, Terry A., McMaster, Robert B., Kessler, Fritz C., and Howard, Hugh H. 2009. *Thematic Cartography and Geovisualiztion* (3rd edition). Upper Saddle Creek, NJ, Pearson/Prentice-Hall.
- Monmonier, Mark. 1998. *How to Lie with Maps* (2nd edition). Chicago, IL, University of Chicago Press.

Readings – Additional readings that focus on topics relevant to course themes will be provided through Blackboard.

- Brewer, Cynthia. 2005. *Designing Better Maps*. Redlands, CA, Esri Press.
- Fontshop International. 2010. *Meet Your Type: A Field Guide to Typography*. (available at http://classic.fontshop.com/education/pdf/fsfinalbook_single.pdf).
- Kimerling, Jon A., Buckley, Aileen R., Muehrcke, Phillip C., and Muehrcke, Juliana O. 2012. *Map Use: Reading and Analysis* (7th edition). Redlands, CA, Esri Press.
- Kraak, Menno-Jan 2014. *Mapping time: Illustrated by Minard's map of Napoleon's Russian Campaign of 1812*. Redlands, CA, Esri Press.

- Muehlenhaus, Ian 2013. *Web Cartography: Map Design for Interactive and Mobile Devices*, The Netherlands, CRC Press.
- Shepherd, Ifan D. H. 2008. Travails in the third dimension: A critical evaluation of three-dimensional geographical visualization. In Dodge, Martin, Mary McDerby and Martin Turner (eds.) *Geographic Visualization: Concepts, Tools and Applications*. New York, John Wiley and Sons: 199-222.

Description and Assessment of Assignments

Weekly or Biweekly Assignments

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

Resume Assignment (2%) – 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 (24%) – Twelve quizzes will be administered throughout the semester and will afford each of you the opportunity to demonstrate your knowledge and understanding of weekly themes, which are shown in the Course Schedule on the latter pages of this syllabus.

Discussion Forums (8%) – These will focus on varying combinations of theory and practice and anticipate that you will post a minimum of one message per forum and at least two replies to messages posted by your classmates in a forum at designated times throughout the semester.

Map Exercises 1 – 4, 8 – 11 (22%) – Most weeks you will be expected to complete a map exercise after you complete the relevant quiz. 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.

Map Exercises 5 – 7 (22%) – These weekly tutorials 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. These tutorials are open-ended. Your work will be assessed through a rubric.

Final Project

The final project 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 your own map, which will require you to 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 and peer review comments (1 point); 4) the final version of your map (12 points); and 5) a peer review on the final version of maps (2 points).

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

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 593 course assignments and their point distribution:

Assessment	Number	Points Each	Total Points
Weekly or Biweekly Assignments			
Resume Assignment	1	2	2
Quizzes	12	1-3	24
Discussion Forums	4	2	8
Map Exercises 1 – 4, 8 – 11	8	2 - 4	22
Map Exercises 5 – 7	3	6 - 8	22
Project Components			
Proposal	1	5	5
Individual Meeting	1	2	2
Draft Map	1	1	1
Final Map	1	12	12
Peer Review	1	2	2
Total			
	33	-	100

Assignment Submission Policy

Unless otherwise noted, assignments must be submitted via Blackboard by the due dates specified in the Course Schedule below and on the assignment instructions.

Unless otherwise noted, all Reading Assignments and Tutorials are due by 5:00 pm Pacific Time (PT) on Wednesdays. 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/Assignments	Deliverables/Due Dates
Week 1 1/9	Map Projections	Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 8 Elements of Map Projections and Ch. 9 Selecting an Appropriate Map Projection) Monmonier (1998) How to Lie with Maps (Ch. 2 Elements of the Map) Quiz 1 Discussion Forum 1 Resume Assignment	No deliverables.
Week 2 1/17* *Monday, 1/16 is a university holiday	Terrain Representation Generalization	Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 6 Scale and Generalization and Ch. 20 Visualizing Terrain) Monmonier (1998) How to Lie with Maps (Ch. 3 Map Generalization: Little White Lies and Lots of Them) Quiz 2 Discussion Forum 2 Map Exercise 1	Quiz 1: Wednesday, 1/18 Resume Assignment: Wednesday, 1/18 Discussion Forum 1: Wednesday, 1/18 Your response to Discussion Forum 1: Friday, 1/20
Week 3 1/23	Map Elements	Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 11 Map Elements and Typography and Ch. 12 Cartographic Design) Quiz 3 Map Exercise 2	Quiz 2: Wednesday, 1/25 Map Exercise 1: Wednesday, 1/25 Discussion Forum 2: Wednesday, 1/25 Your response to Discussion Forum 2: Friday, 1/27

<p>Week 4 1/30</p>	<p>Typography</p>	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 11 Map Elements and Typography)</p> <p>Fontshop International (2010) Meet Your Type: A Field Guide to Typography</p> <p>Quiz 4</p> <p>Map Exercise 3</p>	<p>Quiz 3: Wednesday, 2/1</p> <p>Map Exercise 2: Wednesday, 2/1</p> <p>Map Exercise 2: Friday, 2/3</p>
<p>Week 5 2/6</p>	<p>Symbolization</p>	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 5 Principles of Symbolization)</p> <p>Monmonier (1998) How to Lie with Maps (Ch. 2 Elements of the Map)</p> <p>Quiz 5</p> <p>Map Exercise 4</p>	<p>Quiz 4: Wednesday, 2/8</p> <p>Map Exercise 3: Wednesday, 2/8</p>
<p>Week 6 2/13</p>	<p>Principles of Color</p>	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 10 Principles of Color and Ch. 14 Choropleth Mapping)</p> <p>Brewer (2005) Designing Better Maps (Chapter 5: Color Decisions for Mapping)</p> <p>Quiz 6</p> <p>Map Exercise 5</p>	<p>Quiz 5: Wednesday, 2/15</p> <p>Map Exercise 4: Wednesday, 2/15</p>
<p>Week 7 2/21* *Monday, 2/20 is university holiday</p>	<p>Classification & Choropleth Mapping</p>	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 4 Data Classification and Ch. 14 Choropleth Mapping)</p> <p>Monmonier (1998) How to Lie with Maps (Ch. 10 Data Maps: Making Nonsense of the Census)</p> <p>Quiz 7</p> <p>Map Exercise 6</p>	<p>Quiz 6: Wednesday, 2/22</p> <p>Map Exercise 5: Wednesday, 2/22</p> <p>Your response to Map Exercise 5: Friday, 2/24</p>
<p>Week 8 2/27</p>	<p>Proportional Symbols & Dot Density Mapping</p>	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 17 Proportional Symbol and Dot Mapping)</p> <p>Quiz 8</p> <p>Map Exercise 7</p>	<p>Quiz 7: Wednesday, 3/1</p> <p>Map Exercise 6: Wednesday, 3/1</p> <p>Your response to Map Exercise 6: Friday, 3/3</p>

<p>Week 9 3/6</p>	<p>Flow Mapping</p>	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 19 Cartograms and Flow Maps)</p> <p>Quiz 9</p> <p>Map Exercise 8</p> <p>Final Project: Written Proposal</p>	<p>Quiz 8: Wednesday, 3/8</p> <p>Map Exercise 7: Wednesday, 3/8</p> <p>Your response to Map Exercise 7: Friday, 3/10</p>
<p>Week 10 3/20</p>	<p>Cartogram</p> <p>Each student has a meeting for the Final Project.</p>	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 19 Cartograms and Flow Maps)</p> <p>Dent et al. (2009) Cartography: Thematic Map Design (Ch. 10 The Cartogram)</p> <p>Quiz 10</p> <p>Map Exercise 9</p>	<p>Quiz 9: Wednesday, 3/22</p> <p>Map Exercise 8: Wednesday, 3/22</p> <p>Final Project Written Proposal: Wednesday, 3/22</p> <p>Your response to Final Project Written Proposal: Friday, 3/24</p>
<p>Week 11 3/27</p>	<p>Space-time Visualization</p>	<p>Kraak, Menno-Jan (2014) Mapping time: Illustrated by Minard's map of Napoleon's Russian Campaign of 1812. Redlands, CA, Esri Press, (Chapter 5: Maps and time)</p> <p>Quiz 11</p> <p>Map Exercise 10</p>	<p>Quiz 10: Wednesday, 3/29</p> <p>Map Exercise 9: Wednesday, 3/29</p>
<p>Week 12 4/3</p>	<p>Map Design for Web</p>	<p>Muehlenhaus I (2013) Web Cartography: Map Design for Interactive and Mobile Devices, CRC Press. (Chapter 3: Map Elements)</p> <p>Discussion Forum 3</p> <p>Final Project: Draft Map</p>	<p>Quiz 11: Wednesday, 4/5</p> <p>Map Exercise 10: Wednesday, 4/5</p>
<p>Week 13 4/10</p>	<p>3D Visualization</p>	<p>Shepherd (2008) Travails in the third dimension: A critical evaluation of three-dimensional geographical visualization. In Dodge, Martin, Mary McDerby and Martin Turner (eds.) Geographic Visualization: Concepts, Tools and Applications. New York, John Wiley and Sons: 199-222.</p> <p>Quiz 12</p> <p>Map Exercise 11</p>	<p>Discussion Forum 3: Wednesday, 4/12</p> <p>Final Project Draft Map: Wednesday, 4/12</p> <p>Your response to Discussion Forum 3: Friday, 4/14</p> <p>Your response to Final Project Draft Map: Friday, 4/14</p>

Week 14 4/17	Trends in Cartography	Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 26 Trends in Research and Development) Discussion Forum 4	Quiz 12: Wednesday, 4/19 Map Exercise 11: Wednesday, 4/19
Week 15 4/24 *Friday, 4/28 is the last day of class	Wrap-up: Summary of Cartography & Visualization	Final Project: Final Map	Discussion Forum 4: Wednesday, 4/26 Final Project Final Map no later than 5:00 p.m. on Wednesday, 4/26.
Final Exam		Final Project: Peer Review	Submit your response to this peer review activity through the Blackboard discussion forum.

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 Section 11, *Behavior Violating University Standards* <https://policy.usc.edu/student/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>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu> or to the *Department of Public Safety* <http://adminopsnet.usc.edu/department/department-public-safety>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Relationship and Sexual Violence Prevention Services* <http://engemannshc.usc.edu/rsvp/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

Support Systems

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose

primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

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>. This includes instructional videos, remote access to university resources, and other key contact information for distance students.