

## **SSCI 589, Cartography & Visualization**

### *Syllabus*

**Units:** 4

**Term — Day — Time:** Spring, 2018, Online

**Location:** Online

**Instructor:** Katsuhiko “Kirk” Oda

**Office:** AHF B56B

**Office Hours:** Wed 9-10 am PT and Fri 12-1 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](mailto:katsuhio@usc.edu), 213-740-2868 (office),  
<https://bluejeans.com/2137402868> (Bluejeans).

**Library Help:** Andy Rutkowski

**Office:** VKC 36B

**Office Hours:** Tuesdays 10 a.m.-12 noon PT and Thursdays  
4:30-5:30 p.m PT

**Contact Info:** [arutkows@usc.edu](mailto:arutkows@usc.edu), 213-740-6390,  
<http://bit.ly/andyhangout>

**IT Help:** Richard Tsung

**Office:** AHF 146

**Office Hours:** By appointment

**Contact Info:** [ctsung@usc.edu](mailto: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 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 an important 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 – Spatiotemporal 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](mailto: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. They are 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* (3<sup>rd</sup> edition). Upper Saddle Creek, NJ, Pearson/Prentice-Hall.
- Monmonier, Mark. 1998. *How to Lie with Maps* (2<sup>nd</sup> edition). Chicago, IL, University of Chicago Press.

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. 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](http://classic.fontshop.com/education/pdf/fsfinalbook_single.pdf)).
- Kimerling, Jon A., Buckley, Aileen R., Muehrcke, Phillip C., and Muehrcke, Juliana O. 2016. *Map Use: Reading Analysis Interpretation* (8<sup>th</sup> 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.

*Discussion Forums (8%)* – Four 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 – 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 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. 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 22% 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 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 (1 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 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	1	2
<b>Total</b>	<b>33</b>	<b>-</b>	<b>100</b>

## Assignment Submission Policy

Unless otherwise noted, all assignments are due by 5:00 pm Pacific Time (PT) on Fridays 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/Assignments	Deliverables/Due Dates
<b>Week 1</b> 1/8	<b>Map Projections</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 8 Elements of Map Projections and Ch. 9 Selecting an Appropriate Map Projection)  <b>Monmonier (1998)</b> How to Lie with Maps (Ch. 2 Elements of the Map)  Quiz 1  Discussion Forum 1  Resume Assignment	No deliverables.
<b>Week 2</b> 1/16* *Monday, 1/15 is a university holiday	<b>Terrain Representation Generalization</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 6 Scale and Generalization and Ch. 20 Visualizing Terrain)  <b>Monmonier (1998)</b> How to Lie with Maps (Ch. 3 Map Generalization: Little White Lies and Lots of Them)  Quiz 2  Discussion Forum 2  Map Exercise 1	Resume Assignment: Wednesday, 1/17  Quiz 1: Wednesday, 1/17  Discussion Forum 1: Wednesday, 1/17  Your response to Discussion Forum 1: Friday, 1/29
<b>Week 3</b> 1/22	<b>Map Elements</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 11 Map Elements and Typography and Ch. 12 Cartographic Design)  Quiz 3  Map Exercise 2	Quiz 2: Wednesday, 1/24  Map Exercise 1: Wednesday, 1/24  Discussion Forum 2: Wednesday, 1/24  Your response to Discussion Forum 2: Friday, 1/26
<b>Week 4</b> 1/29	<b>Typography</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 11 Map Elements and Typography)  <b>Fontshop International (2010)</b> Meet Your Type: A Field Guide to Typography  Quiz 4  Map Exercise 3	Quiz 3: Wednesday, 1/31  Map Exercise 2: Wednesday, 1/31

	Topic	Readings/Assignments	Deliverables/Due Dates
<b>Week 5</b> 2/5	<b>Symbolization</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 5 Principles of Symbolization)  <b>Monmonier (1998)</b> How to Lie with Maps (Ch. 2 Elements of the Map)  Quiz 5 Map Exercise 4	Your response to Map Exercise 2: Wednesday, 2/7  Quiz 4: Wednesday, 2/7  Map Exercise 3: Wednesday, 2/7
<b>Week 6</b> 2/12	<b>Principles of Color</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 10 Principles of Color and Ch. 14 Choropleth Mapping)  <b>Brewer (2005)</b> Designing Better Maps (Chapter 5: Color Decisions for Mapping)  Quiz 6 Map Exercise 5	Quiz 5: Wednesday, 2/14  Map Exercise 4: Wednesday, 2/14
<b>Week 7</b> 2/20* *Monday, 2/19 is a university holiday	<b>Classification &amp; Choropleth Mapping</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 4 Data Classification and Ch. 14 Choropleth Mapping)  <b>Monmonier (1998)</b> How to Lie with Maps (Ch. 10 Data Maps: Making Nonsense of the Census)  Quiz 7 Map Exercise 6	Quiz 6: Wednesday, 2/21  Map Exercise 5: Wednesday, 2/21
<b>Week 8</b> 2/26	<b>Proportional Symbols &amp; Dot Density Mapping</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 17 Proportional Symbol and Dot Mapping)  Quiz 8 Map Exercise 7	Your response to Map Exercise 5: Wednesday, 2/28  Quiz 7: Wednesday, 2/28  Map Exercise 6: Wednesday, 2/28
<b>Week 9</b> 3/5	<b>Flow Mapping</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 19 Cartograms and Flow Maps)  Quiz 9 Map Exercise 8  <b>Final Project: Written Proposal</b>	Your response to Map Exercise 6: Wednesday, 3/7  Quiz 8: Wednesday, 3/7  Map Exercise 7: Wednesday, 3/7  Your response to Map Exercise 7: Friday, 3/9



	Topic	Readings/Assignments	Deliverables/Due Dates
3/12* *3/11-3/18 is Spring Recess			
<b>Week 10</b> 3/19 Each student has a meeting for the Final Project	<b>Space-time Visualization</b>	<b>Kraak, Menno-Jan (2014)</b> Mapping time: Illustrated by Minard's map of Napoleon's Russian Campaign of 1812. Redlands, CA, Esri Press, (Chapter 5: Maps and time)  Quiz 10  Map Exercise 9	Quiz 9: Wednesday, 3/21  Map Exercise 8: Wednesday, 3/21  <b>Final Project Written Proposal: Wednesday, 3/21</b>  <b>Your response to Final Project Written Proposal: Friday, 3/23</b>
<b>Week 11</b> 3/26	<b>3D Visualization</b>	<b>Shepherd (2008)</b> 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.  Quiz 11  Map Exercise 10	Quiz 10: Wednesday, 3/28  Map Exercise 9: Wednesday, 3/28
<b>Week 12</b> 4/2	<b>Map Design for Web</b>	<b>Muehlenhaus I (2013)</b> Web Cartography: Map Design for Interactive and Mobile Devices, CRC Press. (Chapter 3: Map Elements)  Discussion Forum 3  <b>Final Project: Draft Map</b>	Quiz 11: Wednesday, 4/4  Map Exercise 10: Wednesday, 4/4
<b>Week 13</b> 4/9	<b>Cartogram</b>	<b>Slocum et al. (2009)</b> Thematic Cartography and Geovisualization (Ch. 19 Cartograms and Flow Maps)  <b>Dent et al. (2009)</b> Cartography: Thematic Map Design (Ch. 10 The Cartogram)  Quiz 12  Map Exercise 11	Discussion Forum 3: Wednesday, 4/11  Your response to Discussion Forum 3: Friday, 4/13  <b>Final Project Draft Map: Wednesday, 4/11</b>  <b>Your response to Final Project Draft Map: Friday, 4/13</b>

	Topic	Readings/Assignments	Deliverables/Due Dates
Week 14 4/16	Trends in Cartography	Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 26 Trends in Research and Development)  Discussion Forum 4	Quiz 12: Wednesday, 4/18  Map Exercise 11: Wednesday, 4/18
Week 15 4/23* *Friday, 4/27 is the last day of class	Wrap-up: Summary of Cartography & Visualization	Final Project: Final Map	Discussion Forum 4: Wednesday, 4/25  Final Project Final Map no later than 5:00 p.m. on Wednesday, 4/25
Final Examination		Final Project: Peer Review	Submit your response to this peer review activity by Wednesday, 5/2

## 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

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. [engemannshc.usc.edu/counseling](http://engemannshc.usc.edu/counseling)

*National Suicide Prevention Lifeline* – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. [www.suicidepreventionlifeline.org](http://www.suicidepreventionlifeline.org)

*Relationship and Sexual Violence Prevention Services (RSVP)* – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. [engemannshc.usc.edu/rsvp](http://engemannshc.usc.edu/rsvp)

*Sexual Assault Resource Center*

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: [sarc.usc.edu](http://sarc.usc.edu)

*Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086*

Works with faculty, staff, visitors, applicants, and students around issues of protected class. [equity.usc.edu](http://equity.usc.edu)

*Bias Assessment Response and Support*

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. [studentaffairs.usc.edu/bias-assessment-response-support](http://studentaffairs.usc.edu/bias-assessment-response-support)

*The Office of Disability Services and Programs*

Provides certification for students with disabilities and helps arrange relevant accommodations. [dsp.usc.edu](http://dsp.usc.edu)

*Student Support and Advocacy – (213) 821-4710*

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. [studentaffairs.usc.edu/ssa](http://studentaffairs.usc.edu/ssa)

*Diversity at USC*

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. [diversity.usc.edu](http://diversity.usc.edu)

*USC Emergency Information*

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. [emergency.usc.edu](http://emergency.usc.edu)

*USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.*

Provides overall safety to USC community. [dps.usc.edu](http://dps.usc.edu)

***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.