

SSCI 589 – 35723, Cartography & Visualization

Syllabus

Units: 4

Term — Day — Time: Fall, 2015, Online

Location: Online, via Blackboard

Instructor: Katsuhiko “Kirk” Oda, Ph.D.

Office: AHF B55J

Office Hours: Mondays and Wednesdays, 9:00-10:00 a.m.
PT

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GIS Librarian Help: Katharin Peter

Office: VKC B40a

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IT Help: Richard Tsung

Hours of Service: Mondays to Fridays, 9:00 a.m.-5:00 p.m.
PT

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Course Description

This course is designed to cover concepts and methods for mapping and visualizing geospatial phenomena. It is the elective course for the GIST M.S. and Graduate Certificate programs, the Geospatial Intelligence and Geospatial Leadership Graduate Certificate programs, and the GeoHealth track in the Keck School of Medicine's Master of Public Health program. 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 visualizations 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 class and symbolizing with feature class representations.

Geovisualization – Space-time and 3D visualization.

Map Communication – Cartographic thinking and communication.

The workplace expectations for today's GIS 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 Proficiency and Hardware/Software Required

We have several technologies that will facilitate our course work and our interactions, despite our dispersed locations. These include:

Blackboard – All course materials and correspondence will be posted on the course Blackboard site. As a registered student, you will find this course will show up in your available classes no later than 12:00 noon PT on the first day of classes. It is here that the day-to-day flow of the course will be recorded.

Discussion boards – On the Blackboard site, we will post a number of discussion threads related to various course topics. These threads are very important in terms of providing support to each other while working on class exercises to share hints and helpful tips, as you would do in a classroom setting. I will check the discussion threads periodically and offer occasional comments. Please send your course instructor an email directly if you have a question or concern that requires my immediate attention.

Live meetings and presentations – We will use a browser-based service called Adobe Connect to create synchronous, interactive sessions. With voice and webcam capabilities, Adobe Connect can be used to share presentations and even our desktops between two or more people.

Individual meetings – While Adobe Connect can be used for one-on-one meetings, we generally find it easier to use the free VOIP and chat technology, Skype (<http://www.skype.com/>) for individual chats.

GIST server and tech support – This course will utilize the GIST Servers to provide you with your own virtual desktop. You can access the GIST Server at: <http://gis-gateway.usc.edu>. If you are unable to connect to the server or experience any type of technical issues, send an email to GIST Tech Support at gistsupport@dornsife.usc.edu and make sure to copy (cc) me on the email. GIST Tech Support is available Monday through Friday, 9:00 a.m. to 5:00 p.m. PT. A variety of geospatial software platforms (ArcGIS, e-Cognition, TerrSet, etc.) are provided online via the GIST Server; hence, you do not need to install it on your own computer. Instead, every student must satisfy the following technology requirements: (1) a computer with a fast Internet connection; (2) a functional webcam and a microphone for use whenever a presentation or meeting is scheduled; and (3) a modern web browser, Firefox is recommended, to access the GIST Server (in the event you want or need to).

Required Readings and Supplementary Materials

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

- Slocum, Terry A., Robert B. McMaster, Fritz C. Kessler, and Hugh H. Howard. 2009. *Thematic Cartography and Geovisualization* (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
- Allen, David W. and Jeffery M. Coffey 2010. *GIS Tutorial 3: Advanced Workbook* (1st edition). Redlands, CA, Esri 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
- Dent, Borden, Jeff Torguson, and Thomas Hodler. 2008. *Cartography: Thematic Map Design*. New York, NY, McGraw-Hill Education
- Fontshop International. 2010. *Meet Your Type: A Field Guide to Typography*. (available at http://classic.fontshop.com/education/pdf/fsfinalbook_single.pdf)

- Kimerling, A. Jon, Aileen R. Buckley, Phillip C. Muehrcke, and Juliana O. Muehrcke. 2012. *Map Use: Reading and Analysis* (7th edition). Redlands, CA, Esri Press
- Kraak, Menno-Jan 2008. Geovisualization and time: New opportunities for the space-time cube. In Dodge, Martin, Mary McDerby and Martin Turner (eds.) *Geographic Visualization: Concepts, Tools and Applications*. New York, John Wiley and Sons: 293-306.
- Monmonier, Mark 1990. Strategies for the visualization of geographic time-series data. *Cartographica* 27: 30-45.
- 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.
- Wood, Jo, Sabine Kirscheanbauer, Jurgen Döllner, Adriano Lopes, and Lars Bodum. 2005. Using 3D in visualization. In Jason Dykes, MacEachren, Alan, Menno-Jan Kraak. (eds.) *Exploring Geovisualization*. Oxford, UK, Elsevier: 295-312.

Description and Assessment of Assignments

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

Resume Assignment (1%) – The GIST Programs require all current students to post and maintain a public resume, short biography and recent photo on our shared GIST 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 GIST 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 (22%) – 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 (6%) – 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 (55%) – 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. In addition, you will be asked to review your classmates' maps and provide them with feedback.

Final Project (16%) – 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 four distinct components with their own points and deadlines as follows: (1) a written proposal (3 points); (2) an individual meeting (1 point); (3) a draft map and peer review comments (2 point); and (4) the final version of your map (10 points).

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:

Grading Breakdown

Assignment	Number	% of Grade
Discussion Forums	6	6
Final Project	4	16
Map Exercises	11	55
Quizzes	12	22
Resume Assignment	1	1
TOTALS	32	100

Assignment Submission Policy

Assignments will be submitted for grading via Blackboard using the due dates specified in the Course Schedule below. And finally, it is important to note from the outset that: (1) late postings and assignments will be docked one grade and no grade will be given for postings or assignments turned in more than one week late; and (2) no written work will be accepted for grading after 5:00 p.m. PT on the last day of classes (see the Course Schedule section).

Additional Policies

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. I will also create Blackboard discussion forums throughout the semester that

we will use for the aforementioned assignments and so we can discuss comments and issues related to the course assignments, exercises, and projects as the need arises.

In addition, 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. Check now to make sure that mail sent from both the USC blackboard accounts and my private domain (katsuhio@usc.edu) does not go into your junk mail!

While I am usually online and will probably respond to emails from students relatively quickly, I will endeavor to respond to all email within 24 hours of receipt, aiming for no more than 48 hours delay. In the rare case when I expect to be offline for more than 72 hours, I will post an announcement on the Blackboard site. That said, 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.

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.

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Readings and Homework	Deliverables/Due Dates
Week 1 8/24	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 8/31	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	Submit Resume Assignment, Quiz 1 and Discussion Forum 1 no later than 5:00 p.m. on Monday, 8/31. Submit your response to Discussion Forum 1 no later than 5 p.m. on Wednesday, 9/2.

Week 3 9/7	Map Elements	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 11 Map Elements and Typography and Ch. 12 Cartographic Design)</p> <p>Quiz 3 Map Exercise 2</p>	<p>Submit Quiz 2, Discussion Forum 2 and Map Exercise 1 no later than 5:00 p.m. on Tuesday, 9/8.</p> <p>Submit your response to Discussion Forum 2 no later than 5 p.m. on Wednesday, 9/9.</p>
Week 4 9/14	Typography	<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 Map Exercise 3</p>	<p>Submit Quiz 3 and Map Exercise 2 no later than 5:00 p.m. on Monday, 9/14.</p> <p>Submit your response to Map Exercise 2 no later than 5 p.m. on Wednesday, 9/16.</p>
Week 5 9/21	Symbolization	<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 Map Exercise 4</p>	<p>Submit Quiz 4 and Map Exercise 3 no later than 5:00 p.m. on Monday, 9/21.</p>
Week 6 9/28	Principles of Color	<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 Map Exercise 5</p>	<p>Submit Quiz 5 and Map Exercise 4 no later than 5:00 p.m. on Monday, 9/28.</p>
Week 7 10/5	Classification & Choropleth Mapping	<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 Map Exercise 6</p>	<p>Submit Quiz 6 and Map Exercise 5 no later than 5:00 p.m. on Monday, 10/5.</p> <p>Submit your response to Map Exercise 5 no later than 5 p.m. on Wednesday, 10/7.</p>

Week 8 10/12	Proportional Symbols & Dot Density Mapping	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 17 Proportional Symbol and Dot Mapping)</p> <p>Quiz 8 Map Exercise 7</p>	<p>Submit Quiz 7 and Map Exercise 6 no later than 5:00 p.m. on Monday, 10/12.</p> <p>Submit your response to Map Exercise 6 no later than 5 p.m. on Wednesday, 10/14.</p>
Week 9 10/19	Flow Mapping	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 19 Cartograms and Flow Maps)</p> <p>Quiz 9 Map Exercise 8 Final Project: Written Proposal</p>	<p>Submit Quiz 8 and Map Exercise 7 no later than 5:00 p.m. on Monday, 10/19.</p> <p>Submit your response to Map Exercise 7 no later than 5 p.m. on Wednesday, 10/21.</p>
Week 10 10/26	<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 Map Exercise 9</p>	<p>Submit Quiz 9, Map Exercise 8 and Written Proposal no later than 5:00 p.m. on Monday, 10/26.</p> <p>Submit your response to Written Proposal no later than 5 p.m. on Wednesday, 10/28.</p>
Week 11 11/2	Space-time Visualization	<p>Kraak (2008) Geovisualization and time: New opportunities for the Space-time cube. In Dodge et al. (eds) Geographic Visualization: Concepts, Tools and Applications</p> <p>Monmonier (1990) Strategies for the visualization of geographic time-series data. Cartographica 27: 30-45</p> <p>Quiz 11 Map Exercise 10 Discussion Forum 3</p>	<p>Submit Quiz 10 and Map Exercise 9 and no later than 5:00 p.m. on Monday, 11/2.</p>

Week 12 11/9	3D Visualization	<p>Shepherd (2008) Travails in the Third Dimension: A Critical Evaluation of Three-dimensional Geographical Visualization In Dodge et al. (eds) Geographic Visualization: Concepts, Tools and Applications</p> <p>Wood et al. (2005) Using 3D in Visualization. In Dykes et al. (eds) Exploring Geovisualization</p> <p>Quiz 12 Map Exercise 11 Discussion Forum 4</p>	<p>Submit Quiz 11, Map Exercise 10, Discussion Forum 3 no later than 5:00 p.m. on Monday, 11/9.</p> <p>Submit your response to Discussion Forum 3 no later than 5 p.m. on Wednesday, 11/11.</p>
Week 13 11/16	Map Design for Web	<p>Muehlenhaus I (2013) Web Cartography: Map Design for Interactive and Mobile Devices, CRC Press. (Chapter 3: Map Elements)</p> <p>Discussion Forum 5 Final Project: Draft Map</p>	<p>Submit Quiz 12, Map Exercise 11 and Discussion Forum 4 no later than 5:00 p.m. on Monday, 11/16.</p> <p>Submit your response to Discussion Forum 4 no later than 5 p.m. on Wednesday, 11/18.</p>
Week 14 11/23	Trends in Cartography	<p>Slocum et al. (2009) Thematic Cartography and Geovisualization (Ch. 26 Trends in Research and Development)</p> <p>Discussion Forum 6 Final Project: Draft Map Peer Feedback</p>	<p>Submit Discussion Forum 5 and Final Project Draft Map no later than 5:00 p.m. on Monday, 11/23.</p>
Week 15 11/30	Wrap-up: Summary of Cartography & Visualization	Final Project: Final Map	<p>Submit Discussion Forum 6 no later than 5:00 p.m. on Monday, 11/30.</p> <p>Submit your response to Final Project Draft Map no later than 5 p.m. on Monday, 11/30.</p> <p>Submit your Final Map no later than 5:00 p.m. on Monday, 12/7.</p>

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://scampus.usc.edu/b/11-00-behavior-violating-university-standards-and-appropriate-sanctions/>. 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://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. 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 Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> 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.