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

SSCI 593, Geospatial Data Integration

Syllabus

Units: 4

Term — Day — Time: Spring 2018, Online

Location: Online

Instructor: Katsuhiko "Kirk" Oda, PhD GISP
Office: AHF B56B
Regular Office Hours: Wed 1 - 2 pm PT and Fri 8 -9 am 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

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, 213-740-6390, http://bit.ly/andyhangout

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Course Scope and Purpose

Data integration is key to the successful application of GIS to help address today's environmental and social challenges. Data integration is the process of combining data residing in different sources and sometimes different ontologies, and providing users with a unified view of these data. This process becomes significant in a variety of situations, which include both the commercial (i.e., companies needing to merge their databases) and scientific (i.e., combining research results from different repositories) domains. Data integration has come into play increasingly as the volume and need to share existing data continue to expand exponentially. In fact, the easy access to very advanced data sources and spatial tools in today's GIS is deceptive as it is fairly simple to walk through wizards and push buttons to perform a data extraction or analysis, but it is much more difficult to choose among similar data from different sources and to determine their correct use in GIS-based environments.

This course builds on SSCI 587: Spatial Data Acquisition by considering several additional data streams and the impacts of data quality and related issues on data integration. Students will explore data with different meanings and measurement styles, and use various kinds of data such as Volunteered Geographic Information (VGI) or crowdsourced data, and other forms of geospatial data available through public spatial data infrastructures and web portals. The tools and concepts we will cover apply to medium to advanced data integration and analysis tasks in GIS-based environments. Students will explore these concepts using both proprietary and open source platforms.

In addition, the course, by both necessity and design, serves as an elective for the online GIST M.S. and the GIST, Geospatial Leadership, and Geospatial Intelligence Graduate Certificate Programs. The different student clientele is provided with options in the Final Project so they can align the geospatial data integration tasks tackled in the project with their own professional interests and aspirations.

This course is a graduate level course, so you should expect to be intellectually challenged throughout the semester. As graduate students you must engage with the course content and explore the heady cauldron of ideas, opinion, and analysis. 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 to lead you on this path of discovery, and you will find that you learn much from your fellow classmates. This is especially the case within the milieu of "online learning." It will provide you with an understanding of public domain data types and resources from both the social and scientific domains. It will also teach you how to access public data types, and to explore, assess, pre-process and use them in various integration approaches for GIS-based analysis and applications in real-world settings. Helping you to become an informed data integration analyst is the goal of this course.

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 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.

Learning Outcomes

On completion of this course, students should be able to:

- Develop strategies to capture geospatial data and any accompanying metadata from various sources.
- Identify, download and format vector and raster spatial data from an online spatial data portal.
- Identify spatial data from associated metadata files.
- Integrate multiple geospatial data sources in one or more GIS-based environments.
- Evaluate the impacts of data quality on the outcomes of spatial analysis and decision making.
- Critically evaluate different methodologies for GIS-based integration and analysis and their impact on open distribution.
- Collaborate with others to contribute in an original GIS-based integration project relevant to real-world geospatial problems using Esri's ArcGIS and other GIS tools.
- Evaluate the likely impact of new approaches (linked data, web maps, etc.) for geospatial data integration.

Prerequisite(s): SSCI 581 or permission of the instructor
Co-Requisite(s): None
Recommended Preparation: SSCI 587: Spatial Data Acquisition

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:

- Every student must have a computer with a fast Internet connection (DSL at a minimum).
- Every student must have a functional webcam for use whenever a presentation or meeting is scheduled.
- Every students must have 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.

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. If you don't regularly use your USC email account, please double check to be sure that mail sent from both the USC Blackboard accounts and your instructor's account (noted above) is forwarded to an address you use regularly and does not go into your junk mail!

Your 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 your instructor is off-line for an extended period of time, an announcement will be posted to the class Blackboard site.

Due to the asynchronous nature of this course, it is each student's responsibility to stay informed and connected with others in our course. In addition to email, you are expected to login to Blackboard regularly to check for Announcements.

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 four texts for this course. The first, second, and third texts are available through the USC Libraries as an e-Book. The fourth one will be posted on Blackboard.

- Elwood, S., Goodchild, M. F. and Sui, D. (editors). 2013, *Crowdsourcing Geographic Knowledge: Volunteered Geographic Information (VGI) in Theory and Practice,* New York, NY: Springer.
- Hart, G., and Dolbear, C. 2013. *Linked Data: A Geographic Perspective*, Boca Raton, FL: CRC Press.
- Kerski, J. J., and Clark, J. 2012. *The GIS Guide to Public Domain Data*, Redlands, CA: Esri Press. Mental Maps Section
- Rice, M., Paez, F., Mulhollen, A., Shore, B. and Caldwell, D. 2012, *Crowdsourced Geospatial Data: A Report on the Emerging Phenomena of Crowdsourced and User-generated Geospatial Data,* Alexandria, VA: U.S. Army Topographic Engineering Center

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

- Connors, P., Lei, S., and Kelly, M. 2012, Citizen Science in the Age of Neogeography: Utilizing Volunteered Geographic Information for Environmental Monitoring, *Annals of the Association of American Geographers,* 102(6), 1267-1289.
- Croitoru, A., Crooks, A.T., Radzikowski, J., Stefanidis, A., Vatsavai, R. R. and Wayant, N. 2014, Geoinformatics and Social Media: A New Big Data Challenge, in Karimi, H. (ed.), *Big Data Techniques and Technologies in Geoinformatics.* Boca Raton, FL: CRC Press. pp. 207-232.
- Elwood, S., Goodchild, M., and Sui, D. 2012, Researching Volunteered Geographic Information: Spatial Data, Geographic Research, and New Social Practice. *Annals of the Association of American Geographers,* 102(3), 571-590.
- Goodchild, M. F. 2007. Citizens as Sensors: The World of Volunteered Geography. *GeoJournal*, 69(4), 211–221.
- Goodchild, M. and Li, L. 2012, Assuring the quality of volunteered geographic information, *Spatial Statistics,* 1, 110-120.
- Janowicz, K., Scheider, S., Pehle, T., and Hart, G. 2012. Geospatial semantics and linked spatiotemporal data: Past, present, and future. *Semantic Web*, 3(4), 321-332.
- Sui, D. and Goodchild, M. F. 2011. The Convergence of GIS and Social Media: Challenges for GIScience. *International Journal of Geographical Information Science,* 25(11), 1737–1748.
- The Coalition of Geospatial Organizations (COGO). 2015. Report Card on the U.S. National Spatial Data Infrastructure (NSDI).

Description and Assessment of Assignments

Weekly or Biweekly Assignments

There are several different kinds of assignments with at least one due either weekly or biweekly. These are described in the Weekly Folders on Blackboard. Due dates are shown in the summary that follows.

Resume Assignment – 1 worth 2 points. We require all current students to post and maintain a public resume, short biography and recent photo on our shared SSI Student Community Blackboard site. Please prepare your resume in the SSI template which will be provided to you. Unless you opt out, your resume will be included in the Spatial Sciences Institute Graduate Programs Resume Book. This resume book is compiled annually and, along with our web presence, is used to promote our programs, and more importantly, your skills, experience and professional aspirations.

Discussion Forums – 13 worth a total of 26 points. Weekly, we will explore topics through graded discussion forums and/or blogs. These tasks are based on provided readings and are designed to engage you in the material and to expand your research results beyond what you are personally able to uncover. You are also required to respond to your classmates' postings.

Data Integration Exercises – 4 worth 24 points. These will be hands-on activities that will allow you to explore the real-world application scenarios of data integration using a variety of different data sources, data analysis and integration strategies.

GIS Data Tutorials – 2 worth 18 points. In this set of two tutorials, you will study sources of spatial data, collect data, and learn techniques for processing multiple types of spatial data. Since this course is the capstone course in many ways for the Spatial Acquisition track in the GIST M.S. degree program, you will also summarize all of the core datasets you have analyzed in the other SSCI courses. Please note that these tutorials are biweekly assignments.

Final Project

The Final Project provides an opportunity to integrate all that you have learned in the semester. You will design and perform data integration by using the Data Interoperability extension and develop a tutorial based on the integration project. The final project will be broken up into four distinct components with their own points as follows:

Proposal - 5 points. A brief description about your project and a presentation to present and discuss your proposal.

Data Report - 10 points. A report documenting the quality and properties of data you have identified and acquired for your project.

Data Integration Tutorial - 10 points. A tutorial that instructs on how GIS data can be transformed and integrated. The tutorial will include step-by-step instructions for processing the data and a web map that shows the results of data integration.

Peer Review - 5 points. Review your classmates' tutorials and provide critiques and feedback.

Grading Breakdown

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 593 course assignments and their point distribution:

Assessment	Number	Points Each	Total Points
Weekly or Biweekly Assignments			
Resume Assignment	1	2	2
Discussion Forums	13	2	26
Data Integration Exercises	4	6	24
GIS Data Tutorials	2	9	18
Project Components			
Proposal	1	5	5
Data Report	1	10	10
Data Integration Tutorial	1	10	10
Peer Review	1	5	5
Total	24	-	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.

Course Schedule: A Weekly Breakdown

	Topic	Readings/Assignments	Deliverables/Due Dates
Week 1 1/8	**Introduction to Public Domain Data**	Kerski & Clark: Chs 1 & 4 Resume Assignment Discussion Forum 1	No deliverables

	Topic	Readings/Assignments	Deliverables/Due Dates
Week 2 1/16* *Monday, 1/15 is a university holiday	**Models and Issues of Public Domain Data**	Kerski & Clark: Chs 2 & 3 Discussion Forum 2 Data Integration Exercise 1	Resume Assignment: Wednesday, 1/17 Discussion Forum 1: Wednesday, 1/17 Your response to Discussion Forum 1: Friday, 1/19
Week 3 1/22	**NSDI Framework**	The Coalition of Geospatial Organizations 2015 Discussion Forum 3 Data Integration Exercise 2	Data Integration Exercise 1: Wednesday, 1/24 Discussion Forum 2: Wednesday, 1/24 Your response to Discussion Forum 2: Friday, 1/26
Week 4 1/29	**Future Trends of Public Domain Data**	Kerski & Clark: Chs 9 & 10 Discussion Forum 4 Data Integration Exercise 3	Data Integration Exercise 2: Wednesday, 1/31 Discussion Forum 3: Wednesday, 1/31 Your response to Discussion Forum 3: Friday, 2/2
Week 5 2/5	**Introduction to VGI and Crowdsourcing**	Kerski & Clark: Ch 8 Elwood, Goodchild & Sui eds.: Ch 1 Goodchild, M. F. 2007 Discussion Forum 5 Data Integration Exercise 4	Data Integration Exercise 3: Wednesday, 2/7 Discussion Forum 4: Wednesday, 2/7 Your response to Discussion Forum 4: Friday, 2/9
Week 6 2/12	**Value of VGI**	Elwood, Goodchild & Sui eds.: Chs 2 & 3 Rice, Paez, Mulhollen, Shore & Caldwell: Ch 2 Discussion Forum 6 Final Project: Written Proposal	Data Integration Exercise 4: Wednesday, 2/14 Discussion Forum 5: Wednesday, 2/14 Your response to Discussion Forum 5: Friday, 2/16

	Topic	Readings/Assignments	Deliverables/Due Dates
Week 7 2/20* *Monday, 2/19 is a university holiday	**Typology of VGI**	Elwood, Goodchild & Sui 2012 Rice, Paez, Mulhollen, Shore & Caldwell: Ch 3 Discussion Forum 7 GIS Data Tutorial 1	Discussion Forum 6: Wednesday, 2/21 Written Proposal: Wednesday, 2/21 Your response to Discussion Forum 6: Friday, 2/23 Your response to Written Proposal: Friday, 2/23
Week 8 2/26	**Citizen Science**	Connors, Lei, & Kelly 2012 Elwood, Goodchild & Sui eds. Chs 6 & 7 Discussion Forum 8	Discussion Forum 7: Wednesday, 2/28 Your response to Discussion Forum 7: Friday, 3/2 Proposal Presentation: TBA
Week 9 3/5	**VGI Data Quality**	Goodchild & Li 2012 Rice, Paez, Mulhollen, Shore & Caldwell: Chs 4 & 5 Discussion Forum 9 GIS Data Tutorial 2	GIS Data Tutorial 1: Wednesday, 3/7 Discussion Forum 8: Wednesday, 3/7 Your response to Discussion Forum 8: Friday, 3/9
*3/11-3/18 is Spring Recess			
Week 10 3/19	**Social Media in GIS**	Croitoru, A., Crooks, A.T., Radzikowski, J., Stefanidis, A., Vatsavai, R. R. and Wayant, N. 2014 Sui, D. and Goodchild, M. F. 2011 Discussion Forum 10	Discussion Forum 9: Wednesday, 3/21 Your response to Discussion Forum 9: Friday, 3/23
Week 11 3/26	**Introduction to Linked Data and Semantic Web**	Hart & Dolbear 2013 Chs 1 & 2 Discussion Forum 11 Final Project: Data Report	GIS Data Tutorial 2: Wednesday, 3/28 Discussion Forum 10: Wednesday, 3/28 Your response to Discussion Forum 10: Friday, 3/30

	Topic	Readings/Assignments	Deliverables/Due Dates
Week 12 4/2	**GI in Semantic Web**	Hart & Dolbear 2013 Chs 3 & 4 Discussion Forum 12	Discussion Forum 11: Wednesday, 4/4 Your response to Discussion Forum 11: Friday, 4/6
Week 13 4/9	**Technology of Linked Data**	Hart & Dolbear 2013 Chs 5 & 6 Discussion Forum 13 Final Project: Data Integration Tutorial	Discussion Forum 12: Wednesday, 4/11 Data Report: Wednesday, 4/11 Your response to Discussion Forum 12 Friday, 4/13 Your response to Data Report: Friday, 4/13
Week 14 4/16	**Geographic Ontologies**	Hart & Dolbear 2013 Chs 9 & 10	No deliverables
Week 15 4/23 *Friday, 4/27 is the last day of class	**Future of Linked Spatiotemporal Data**	Janowicz, Scheider, Pehle, & Hart 2012	Discussion Forum 13: Wednesday, 4/25 Data Integration Tutorial: Wednesday, 4/25 Your response to Discussion Forum 13: Friday, 4/27
Final Examination		Final Project: Peer Review	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. 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

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

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

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

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

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

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations. 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

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

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

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

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.