SSCI 593, Geospatial Data Integration

Syllabus

Units: 4

Term — Day — Time: Spring 2017, Online

Location: Online

Instructor: Katsuhiko "Kirk" Oda, PhD GISP
Office: AHF B56B
Regular 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

Library Help: Katharin Peter
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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 as well as 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 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." 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:

- 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 three texts for this course. The first and second texts are available through the USC Libraries as an e-Book. The third 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.
- 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.

- Bennett, J. 2010. *OpenStreetMap: Be Your Own Cartographer,* Birmingham, Packt Publishing (Chapter 1: Making a Free, Editable Map of the World)
- 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.

- Sester, M., Arsanjani, J., Klammer, R., Burghardt, D., and Haunert, J. 2014, "Chapter 5: Integrating and Generalising Volunteered Geographic Information" in Burghardt, D., Duchene, C., and Mackaness, W. (eds.) *Abstracting Geographic Information in a Data Rich World: Methodologies and Applications of Map Generalization.* New York, NY: Springer.

- 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, blogs and/or wikis. 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 1 - 4 – 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.

Data Integration Exercises 5 and 6 – 2 worth 18 points. These are more substantial than the other tutorials, requiring more thought and effort. Please note that these tutorials are biweekly assignments.

Final Project

The Final Project provides a group work opportunity to integrate all that you have learned in the semester. More details about the project will be provided as the course develops. However, the final project will be broken up into three distinct components with their own points as follows:

Proposal - 5 points. A brief description about your project and a meeting for you to present and discuss your proposal and the various ways you might modify it.

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

Project Report - 12 points. A final report will describe the problem or scenario that your will attempt to address, the data and technologies that you will choose for the project, the method that you will implement, the outcomes that you will obtain, and any implications and suggestions that you will conclude.

Peer Review - 3 points. Review your classmates' project reports and provide critiques and feedback on their reports.

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
Discussion Forums	13	2	26
Data Integration Exercises 1 - 6	6	6 - 9	42
Project Components			
Proposal	1	5	5
Data Report	1	10	10
Final Report	1	12	12
Peer Review	1	3	3
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.

Schedule

	Topic	Readings/Assignments	Deliverables/Due Dates
Week 1 1/9	**Introduction: Public Domain Data**	Kerski & Clark: Ch 1 Resume Assignment Discussion Forum 1	No deliverables.
Week 2 1/17* *Monday, 1/16 is a university holiday	**Introduction: VGI and Crowdsourcing**	Kerski & Clark: Ch 8 Elwood, Goodchild & Sui eds.: Ch 1 Goodchild, M. F. 2007 Discussion Forum 2 Data Integration Exercise 1	Resume Assignment: Wednesday, 1/18 Discussion Forum 1: Wednesday, 1/18 Your response to Discussion Forum 1: Friday, 1/20
Week 3 1/23	**Introduction: GIS and Social Media**	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 3 Data Integration Exercise 2	Data Integration Exercise 1: Wednesday, 1/25 Discussion Forum 2: Wednesday, 1/25 Your response to Discussion Forum 2: Friday, 1/27

Week 4 1/30	Public Domain Data: Models and Issues	Kerski & Clark: Ch 2&3 Discussion Forum 4 Data Integration Exercise 3	Data Integration Exercise 2: Wednesday, 2/1 Discussion Forum 3: Wednesday, 2/1 Your response to Discussion Forum 3: Friday, 2/3
Week 5 2/6	Public Domain Data: Data Portals and Metadata	Kerski & Clark: Ch 5 Discussion Forum 5 Data Integration Exercise 4	Data Integration Exercise 3: Wednesday, 2/8 Discussion Forum 4: Wednesday, 2/8 Your response to Discussion Forum 4: Friday, 2/10
Week 6 2/13	Public Domain Data: NSDI Framework	The Coalition of Geospatial Organizations 2015 Discussion Forum 6 Data Integration Exercise 5	Data Integration Exercise 4: Wednesday, 2/15 Discussion Forum 5: Wednesday, 2/15 Your response to Discussion Forum 5: Friday, 2/17
Week 7 2/21* *Monday, 2/20 is university holiday	VGI Public Participation: Value of VGI	Elwood, Goodchild & Sui eds.: Ch 2&3 Rice, Paez, Mulhollen, Shore & Caldwell: Ch 2 Discussion Forum 7	Submit Discussion Forum 6: Wednesday, 2/22 Your response to Discussion Forum 6: Friday, 2/24
Week 8 2/27	VGI Public Participation: Typology of VGI	Elwood, Goodchild & Sui 2012 Rice, Paez, Mulhollen, Shore & Caldwell: Ch 3 Discussion Forum 8 Data Integration Exercise 6	Data Integration Exercise 5: Wednesday, 3/1 Discussion Forum 7: Wednesday, 3/1 Your response to Discussion Forum 7: Friday, 3/3
Week 9 3/6	VGI Public Participation: Citizen Science	Connors, Lei, & Kelly 2012 Elwood, Goodchild & Sui eds. Ch 6&7 Discussion Forum 9 Final Project: Written Proposal	Discussion Forum 8: Wednesday, 3/8 Your response to Discussion Forum 8: Friday, 3/10

Week 10 3/20	**VGI Geographic Knowledge Production: Emerging Applications**	Elwood, Goodchild & Sui eds.: Ch 14 – 18 Discussion Forum 10	Data Integration Exercise 6: Wednesday, 3/22 Discussion Forum 9: Wednesday, 3/22 Final Project Written Proposal: Wednesday, 3/22 Your response to Discussion Forum 9: Friday, 3/24 Your response to Final Project Written Proposal: Friday, 3/24
Week 11 3/27	**VGI Geographic Knowledge Production: Data Quality**	Goodchild & Li 2012 Rice, Paez, Mulhollen, Shore & Caldwell: Ch 4&5 Discussion Forum 11	Submit Discussion Forum 10: Wednesday, 3/29 Your response to Discussion Forum 10: Friday, 3/31
Week 12 4/3	**VGI Geographic Knowledge Production: Methods and Visualization**	Sester, M., Arsanjani, J., Klammer, R., Burghardt, D., and Haunert, J. 2014 Discussion Forum 12 Final Project: Data Report	Discussion Forum 11: Wednesday, 4/5 Your response to Discussion Forum 11: Friday, 4/7
Week 13 4/10	**Future Trends: Public Domain Data in GIS**	Kerski & Clark: Ch 9&10 Discussion Forum 13	Discussion Forum 12: Wednesday, 4/12 Final Project Data Report: Wednesday, 4/12 Your response to Discussion Forum 12 Friday, 4/14 Your response to Final Project Data Report: Friday, 4/14
Week 14 4/17	**Future Trends: New Challenges in VGI and Crowdsourcing**	Elwood, Goodchild & Sui eds.: Ch 20 Final Project: Final Report	Discussion Forum 13: Wednesday, 4/19 Your response to Discussion Forum 13: Friday, 4/21

Week 15 4/24 *Friday, 4/28 is the last day of class	Wrap-up: Summary of GIS Data Integration		Final Project Final Report 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.