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

SSCI 680, Advanced Spatial Computing

Syllabus

Units: 4

Term — Day — Time: Fall 2018, TBD

Location: AHF 145D

Instructor: Yao-Yi Chiang, PhD GISP
Office: AHF B55C
Regular Office Hours: Tuesdays, 4 to 5 p.m. and Thursdays, 11 a.m. to 12 p.m. Pacific Time, or by appointment.

Contact Info: yaoyic@usc.edu, https://bluejeans.com/5067546751 (BlueJeans), 213-740-7618 (office), yaoyichiang (Skype)

Library Help: Andy Rutkowski
Office: VKC 36B
Office Hours: Tuesdays, 10 a.m. to 12 p.m. and Thursdays, 4:30 to 5:30 p.m. PT
Contact Info: arutkows@usc.edu, 213-740-6390, http://bit.ly/andyhangout

IT Help: Richard Tsung
Office: AHF 145D
Office Hours: By appointment
Contact Info: ctsung@usc.edu, 213-821-4415 (office)

Course Scope and Purpose

This class will cover the theoretical foundations, methods, techniques, and software systems for spatial computing. This includes the latest research on topics that are central to spatial-enabled computing technologies and systems, including the geospatial semantic web, geospatial linked data, spatial data mining, geocoding, document linking, location-based services, volunteered geographic information, geospatial feature extraction, geospatial layer registration and alignment, and geospatial mashups. This class will also cover various types of spatial data, including satellite and aerial imagery, raster (scanned) maps, vector datasets, news articles, web pages, linked data, and streaming data. Students will also gain a deep understanding and hands-on experience in the software for spatial computing, including geographic information systems (e.g. ArcGIS), online GIS (e.g. ArcGIS Online, Bing Maps, Google Earth), semantic web tools, and spatial databases through a combination of homework and projects. Students will learn about the wide variety of geospatial data and services available, including how to find relevant data and transform it as needed so that it can be used for solving specific problems.

Learning Outcomes

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

- Describe the theoretical foundations of geospatial data and its various representations
- Select and use the appropriate spatial computing technologies and systems to solve any of a variety of real-world problems
- Build integrated applications that combine geographic data and applications for processing that data
- Understand, create, and apply semantic descriptions of geographic data which can then be used for searching, integrating, and sharing geographic knowledge
- Discuss the relevant spatial computing systems and techniques for working with geospatial data
- Apply relevant spatial computing techniques to solve spatial problems
- Critically evaluate spatial computing software and systems and determine whether they have been applied in appropriate ways

Prerequisite(s): None
Co-Requisite(s): None
Concurrent Enrollment: None
Recommended Preparation: Enrollment in a USC PhD Program

Course Structure

The course will be taught using a lecture format where the instructor will present the core topics, and the students will participate and give lectures on some of the subtopics. There are weekly quizzes to ensure that students keep up with the material and readings. In the first half of the course, there are also weekly homework assignments to give students first-hand experience with the wide variety of software and systems that can be used for spatial computing. In the second half of the course, students will form teams and propose and conduct a class project that will give them more depth in one or more course topics of interest. The class will encourage student participation with ample discussion time for reviewing readings, homework, quizzes, and other course material. This is a four credit, one semester course. Students should expect to spend 10-15 hours per week completing the work in this course.

Technological and Communication Requirements

The mapping software and geospatial data required for course assignments will be accessed using computing resources provided by the Spatial Sciences Institute. In addition, every student must have the following technology requirements:

- A computer with a fast Internet connection
- An up-to-date web browser to access the SSI Server

SSI Server and Tech Support – This course utilizes the SSI GIST 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 GIST Tech Support at spatial_support@usc.edu, making sure to copy (cc) me on the email.

Communications – 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 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 in addition to the face-to-face contact you will have in the classroom. 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

The weekly readings will be accessed via the USC Library's electronic collections and / or provided by the instructor via Blackboard.

1. Clarke K C (2011) *Getting Started with Geographic Information Systems* (Fifth Edition). Upper Saddle Creek, NJ: Prentice Hall (Chapters 2 and 3)
2. Clemmer G (2013) *The GIS 20 Essential Skills.* Redlands, CA, Esri Press
3. Briggs D J, Collins S, Elliott P, Fischer P, Kingham S, Lebret E, … Van Der Veen A (1997). Mapping urban air pollution using GIS: a regression-based approach. *International Journal of Geographical Information Science*, *11*(7): 699–718
4. Hoek G, Beelen R, de Hoogh K, Vienneau D, Gulliver J, Fischer P, and Briggs D (2008). A review of land-use regression models to assess spatial variation of outdoor air pollution. *Atmospheric Environment*, *42*(33): 7561–7578
5. Jiang W, Wang Y, Tsou M-H, and Fu X (2015). Using social media to detect outdoor air pollution and monitor air quality index (AQI): A geo-targeted spatiotemporal analysis framework with Sina weibo (Chinese Twitter). *PloS One*, *10*(10), e0141185
6. Güting R H (1994) An introduction to spatial database systems. *VLDB Journal* 3: 357-399
7. Boundless (2017) Introduction to PostGIS. WWW document. Retrieved from http://workshops.boundlessgeo.com/postgis-intro/
8. Microsoft (2017) Bing Maps Videos. WWW document. Retrieved from http://www.microsoft.com/maps/developers/videos.aspx
9. Google (2017) Google Earth Tutorials. WWW document. Retrieved from http://www.google.com/earth/outreach/tutorials/all.html
10. Chiang Y-Y (2017). Unlocking Textual Content from Historical Maps – Potentials & Applications, Trends, and Outlooks. In S. K.C., H. Mallikarjun, B. Vitoantonio, and N. Atul (eds.), *Recent Trends in Image Processing and Pattern Recognition. Communications in Computer and Information Science, volume 709,* Singapore: Springer: 111–124
11. Jiang B (2012) Volunteered Geographic Information and computational geography: New perspectives. In Sui D, Elwood S, and Goodchild M F (eds) *Crowdsourcing Geographic Knowledge: Volunteered Geographic Information (VGI) in Theory and Practice.* Berlin, Germany: Springer: 125-138
12. Goodchild M F and Li L (2012) Assuring the quality of volunteered geographic information. *Spatial Statistics* 1: 110-120
13. Lin Y, Pan F, Chiang Y-Y, Stripelis D, Ambite J L, Eckel S P, and Habre R (2017) Mining public datasets for modeling intra-city $PM_{2.5}$ concentrations at a fine spatial resolution. Submitted to SIGSPATIAL 2017, Redondo Beach, CA USA
14. Arsanjani J, Helbich M, Bakillah M, Hagenauer J, and Zipf A (2013). Toward mapping land-use patterns from volunteered geographic information. *International Journal of Geographical Information Science*, *27*(12): 2264–2278
15. WorldClim (2017) WWW document. Retrieved from http://worldclim.org/version2
16. Swartz A (2002) The Semantic Web in Breadth. WWW document. Retrieved from http://logicerror.com/semanticWeb-long

17. Palmer S B (2001) The Semantic Web: An Introduction. WWW document. Retrieved from http://infomesh.net/2001/swintro/
18. Fonseca F T (2008) Geospatial semantic web. In Shekhar S and Xiong H (eds) *Encyclopedia of GIS.* Berlin, Germany: Springer: 388-391
19. Kuhn W (2005) Geospatial semantics: Why, of what, and how? In Spaccapietra S and Zimányi E (eds) *Journal on Data Semantics III.* Lecture Notes in Computer Science Vol. 3534: 1-24. Berlin, Germany: Springer
20. Becker C and Bizer C (2009) Exploring the geospatial semantic web with DBpedia Mobile. *Web Semantics: Science, Services and Agents on the World Wide Web,* Vol. 7(4): 278-286
21. Duan, W and Chiang, Y-Y (2016) Building knowledge graph from public data for predictive analysis - A case study on predicting technology future in space and time. In *Proceedings of the 5th ACM SIGSPATIAL International Workshop on Analytics for Big Geospatial Data*, San Francisco, CA, USA: 7–13
22. Koubarakis M, Kyzirakos K, Karpathiotakis M, Nikolaou Ch, Sioutis M, Garbis G, and Bereta K (2012) Introduction in stRDF and stSPARQL. WWW document. Retrieved from http://www.strabon.di.uoa.gr/files/stSPARQL_tutorial.pdf
23. Parundekar R, Knoblock C A, and Ambite J L (2010) Aligning ontologies of geospatial linked data. In *Proceedings of the Workshop on Linked Spatiotemporal Data, in conjunction with the 6th International Conference on Geographic Information Science (GIScience 2010). Zurich (available at* http://www.isi.edu/integration/papers/parundekar10-lstd.pdf)
24. Janowicz K, Scheider S, Pehle T, and Hart G (2012) Geospatial semantics and linked spatiotemporal data: Past, present, and future. Semantic Web 3: 321-332 (available at http://www.semantic-web-journal.net/content/geospatial-semantics-and-linked-spatiotemporal-data-–-past-present-and-future)
25. Bakshi R, Knoblock C A, and Thakkar S (2004) Exploiting online sources to accurately geocode addresses. In *Proceedings of the Twelfth ACM International Symposium on Advances in Geographic Information Systems,* Washington, DC: 194-203
26. Goldberg D W and Cockburn M G (2010) Improving geocode accuracy with candidate selection criteria. *Transactions in GIS* 14(S1): 129-146
27. Goldberg D W, Wilson J P, and Cockburn M G (2010) Toward quantitative geocode accuracy metrics. In *Proceedings of the Ninth International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences,* Leicester, United Kingdom: 329-332
28. Goldberg D W, Knoblock C A, and Wilson J P (2007) From text to geographic coordinates: The current state of geocoding. *Journal of the Urban and Regional Information Systems Association* 19(1): 33-46
29. Davis C A Jr, Fonseca F T, and Borges K A V (2003) A flexible addressing system for approximate geocoding. In *Proceedings of the Fifth Brazilian Symposium on GeoInformatics,* Campos do Jordao, Brazil

30. Zandbergen P A (2008) A comparison of address point, parcel and street geocoding techniques. *Computers, Environment and Urban Systems* 32: 214-232
31. Knoblock C A (2012) Reduce data overload. *Earth Imaging Journal* March/April 2012: 28-30
32. Lieberman M D, Samet H, Sankaranarayanan J, and Sperling J (2007) STEWARD: Architecture of a spatio-textual search engine. In *Proceedings of the Fifteenth ACM International Symposium on Advances in Geographic Information Systems*, Seattle, Washington: 186-193
33. Lieberman M D, Samet H, and Sankaranarayanan J (2010) Geotagging: Using proximity, sibling, and prominence clues to understand comma groups. In *Proceedings of the Sixth Workshop on Geographic Information Retrieval,* Zurich, Switzerland
34. Amitay E, Har'El N, Sivan R, and Soffer A (2004) Web-a-where: Geotagging Web content. In *Proceedings of Twenty-Seventh International Conference of the ACM Special Interest Group on Information Retrieval,* Sheffield, United Kingdom: 273-280
35. Quercini G, Samet H, Sankaranarayanan J, and Lieberman M D (2010) Determining the spatial reader scopes of news sources using local lexicons. In *Proceedings of the Eighteenth ACM International Conference on Advances in Geographic Information Systems,* San Jose, California: 43-52
36. Alex, B., Byrne, K., Grover, C., & Tobin, R. (2015). Adapting the Edinburgh geoparser for historical georeferencing. *International Journal of Humanities and Arts Computing*, *9*(1), 15–35
37. Yuan, M. (2010). Mapping text. In D. J. Bodenhamer, J. Corrigan, & T. M. Harris (Eds.), *The Spatial Humanities: GIS and the future of humanities scholarship* (Bloomington, IN: Indiana University Press)
38. Gelernter, J., & Zhang, W. (2013). Cross-lingual geo-parsing for non-structured data. In *Proceedings of the 7th ACM Workshop on Geographic Information Retrieval*. New York, NY, USA: 64-71
39. Monteiro B R, Davis C A, Jr, and Fonseca F (2016). A survey on the geographic scope of textual documents. *Computers & Geosciences*, *96*: 23–34
40. Chen C-C, Knoblock C A, and Shahabi C (2006) Automatically conflating road vector data with orthoimagery. *GeoInformatica* 10: 495-530
41. Chen C-C, Knoblock C A, and Shahabi C (2008) Automatically and accurately conflating raster maps with orthoimagery. *GeoInformatica* 12: 377-410
42. Wu X, Carceroni R, Fang H, Zelinka S, and Kirmse A (2007) Automatic alignment of large-scale aerial rasters to road-maps. In *Proceedings of the Fifteenth ACM International Symposium on Advances in Geographic Information Systems,* Seattle, Washington: 1–8
43. Wu, J., Wan, Y., Chiang, Y.-Y., Fu, Z., Deng, M. (January, 2018) A Matching Algorithm Based on Voronoi Diagram for Multi-Scale Polygonal Residential Areas. IEEE Access. doi: 10.1109/ACCESS.2018.2793302 (preprint)

44. Chiang Y-Y, Leyk S, Honarvar Nazari N, Moghaddam S, and Tan T X (2016) Assessing impact of graphical quality on automatic text recognition in digital maps. *Computers & Geosciences*, 93:21–35
45. Chiang Y-Y and Knoblock C A (2014a) Recognizing text in raster maps. *GeoInformatica*, 19(1):1–27
46. Chiang Y-Y, Leyk S, and Knoblock, C A (2014b). A survey of digital map processing techniques. *ACM Computing Surveys*, 47(1):1–44
47. Li L, Nagy G, Samal A, Seth S C, and Xu Y (2000) Integrated text and line-art extraction from a topographic map. *International Journal of Document Analysis and Recognition* 2: 177-185
48. Kerle N and de Leeuw J (2009) Reviving legacy population maps with object-oriented image processing techniques. *IEEE Transactions on Geoscience and Remote Sensing* 47: 2392-2402
49. Leyk S and Boesch R (2010) Colors of the past: color image segmentation in historical topographic maps based on homogeneity. *GeoInformatica* 14: 1-21
50. Chiang Y-Y (2015) Querying historical maps as a unified, structured, and linked spatiotemporal source (vision paper). In *Proceedings of the 23rd ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, Seattle, WA, USA: 16:1–16:4
51. Uhl, J. H., Leyk, S., Chiang, Y.-Y., Duan, W., and Knoblock, C. A. (2017) Extracting Human Settlement Footprint from Historical Topographic Map Series Using Context-Based Machine Learning. In *Proceedings of the IAPR 8th International Conference on Pattern Recognition Systems*, pp. 15 – 21, Madrid, Spain (best paper award).
52. Duan, W., Chiang, Y.-Y., Knoblock, C. A., Vinil, J., Feldman, D., Uhl, J. H., and Leyk, S. (2017) Automatic Alignment of Vector Data with Geographic Features for Feature Recognition in Historical Maps. In Proceedings of the First GeoAI Workshop, pp. 45 – 54, Redondo Beach, CA USA.
53. Shekhar S, Zhang P, Huang Y, and Vatsavai R R (2003) Trends in spatial data mining. In Kargupta H and Joshi A (eds) *Data Mining: Next Generation Challenges and Future Directions.* Cambridge, MA, AAAI/MIT Press: 357-380
54. Shekhar S, Jiang Z, Ali R Y, Eftelioglu E, Tang X, Gunturi V M V, and Zhou X (2015). Spatiotemporal Data Mining: A Computational Perspective. *ISPRS International Journal of Geo-Information*, *4*(4): 2306–2338
55. Gupta S and Knoblock C A (2010) A framework for integrating and reasoning about geospatial data. In *Proceedings of the Sixth International Conference on Geographic Information Science*, Zurich, Switzerland
56. Michalowski M and Knoblock C A (2005) A constraint satisfaction approach to geospatial reasoning. In *Proceedings of the Twentieth National Conference on Artificial Intelligence*, Pittsburgh, Pennsylvania

57. O'Brien M A and Irvine J M (2004) Information fusion for feature extraction and the development of geospatial information. In *Proceedings of the Seventh International Conference on Information Fusion,* Stockholm, Sweden
58. Savopol F and Armenakis C (2002) Merging of heterogeneous data for emergency mapping: Data integration or data fusion? *International Archives of Photogrammetry Remote Sensing and Spatial Information Sciences* 34(4/w4): 668-674

Description and Assessment of Assignments

Students must prepare a lecture, participate in a team project, participate in class discussion, take weekly quizzes, and turn in homework assignments.

Your grade in this class will be determined based on several different assessment tools.

Class Participation (10%) – A class participation grade for the semester will be assigned based upon how actively students engage in the course. Students will be required to read all material outlined for each week of the course, and be prepared to lead and participate in group discussions about the readings in class. Failure to attend, or not be adequately prepared to discuss the readings will lead to the assignment of a lower grade for that week.

Class Presentation (20%) – Students will conduct a seminar on a topic determined in consultation with the instructor. Students will be expected to become an expert on that topic and present a short lecture of 30-45 minutes on the topic.

Weekly Assignments (20%) – Students will be assigned five weekly homework during the first half of the course.

Quizzes (20%) – There will be weekly quizzes on the lectures and readings from the previous week. There is no final, so this is the assessment of how well the students have learned the material.

Team Project (30%) – In the second half of the course, students will work in teams on projects determined in consultation with the instructor. The team will propose their own projects based on the topics covered in class. The grades for the final project will be spread across three components as follows: (1) the proposal describing the proposed project, including software to be implemented and any data to be acquired (10%), (2) a final report (10%), and (3) both an in-class and a recorded demo presentation video of your final project (10%). The proposal, final report, and presentation need to address the following questions: "What is the project trying to do?", "How is it done today, and what are the limits of current practice?", "What is your approach, and what is new in your approach?", "Who cares? If you succeed, what difference will it make?", "How do you know if your approach is successful?", and "What are the future extensions?"[1]

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[1] This is the modified version of the famous "Heilmeier Catechism": http://www.darpa.mil/work-with-us/heilmeier-catechism

Grading Breakdown

Careful planning and a serious, consistent commitment will be required for you to successfully navigate the various deliverables in this and other SSI graduate courses. The table below summarizes the SSCI 680 course assignments and their point distribution:

Assessment	Number	Points Each	Total Points
Class Participation and Presentations, Quizzes, and Assignments			
Class Participation	--	--	10
Quizzes	10	2	20
Weekly Assignments	5	4	20
Class Presentation	1	10	20
Project Components			
Proposal	1	10	10
Final Report	1	10	10
Final Presentation/Video	1	10	10
Totals	21	-	100

Assignment Submission Policy

Assignments will be submitted for grading via Blackboard using the due dates specified in the Course Schedule below.

Additional Policies

Students are expected to attend and participate in every class session and to complete and upload all assignments before the deadlines detailed in the Course Schedule.

Strict penalties apply for late assignments as follows:

- All assignments will be penalized 2 points up to SEVEN days late. No points will be given for submissions more than SEVEN days late. Note that all assignments worth 2 points will receive 0 points if submitted late.
- Every student has FIVE free late days for the homework assignments. You can use these five days for any reason separately or together to avoid the late penalty. There will be no other extensions for any reason.

- Additionally, no written work will be accepted for grading after *11:59 pm Pacific Time (PT)* on the last day of classes.

Schedule

	Topic	Readings and Assignments	Deliverables/Due Dates
Week 1 8/20	**Introduction to Spatial Computing:** Spatial Data Basics Brief introductions with a discussion of class goals, projects, technologies, plans, and expectations Introduction to basics of spatial data, including representations of spatial data, structured spatial data, unstructured spatial data, streaming data, coordinate systems, datum, projections, etc.	Clarke (2011)	- Group discussion based on reading
Week 2 8/27	**Introduction to Spatial Computing (Cont'd):** More than Geographic Information Systems Introduction to real-world spatial computing problems and challenges in using traditional GI systems (using the traditional air quality modeling work as an example) Hands-on use of ArcGIS and QGIS to develop familiarity with the limitations and required capabilities in tackling spatial computing problems	Clemmer (2013); Briggs et al. (1997); Hoek et al. (2008); Jiang et al. (2015)	- Group discussion based on reading - In-class quiz
Week 3 9/4* ***Monday, 9/3 is university holiday**	**Structured Spatial Data:** Spatial Databases and Beyond Introduction to capabilities of spatial systems that handle large spatial datasets Hands-on use of the Postgres PostGIS spatial database	Güting (1994); Boundless (2017)	- Group discussion based on reading - In-class quiz - Submit assignment 1 on the Blackboard no later than 11:59 p.m. on Mon., 9/10

Week 4 9/10	**Online Spatial Data:** <u>Online GIS</u> Discussion and hands-on training with online GIS software and datasets, with a focus on Google Maps, Bing Maps, and Google Earth	Microsoft (2017) and Google (2017)	- Group discussion based on reading - In-class quiz
Week 5 9/17	**Online Spatial Data (Cont'd):** <u>Publicly Available Online Geospatial Datasets</u> Introduction to recent developments and applications of publicly available geospatial datasets online, including volunteered geographic information (VGI), widely-used open geospatial sources, techniques for crowd-sourcing data Introduction to attempts to evaluate the quality of VGI data	Chiang (2017); Jiang (2012); Goodchild & Li (2012); Lin et al. (2017); Arsanjani et al. (2013); WorldClim (2017)	- Group discussion based on reading - In-class quiz - Submit assignment 2 on the Blackboard no later than 11:59 p.m. on Mon., 9/24
Week 6 9/24	**Machine-Understandable Spatial Data:** <u>Geospatial Semantic Web</u> Introduction to methods and applications for representing and reasoning about geospatial data using the infrastructure of the Semantic Web Hands-on use of tools for creating and using geospatial semantic data.	Swartz (2002); Palmer (2001); Fonseca (2008); Kuhn (2005); Becker & Bizer (2009); Duan and Chiang (2016)	- Group discussion based on reading - In-class quiz - Submit assignment 3 on the Blackboard no later than 11:59 p.m. on Mon., 10/1
Week 7 10/1	**Machine-Understandable Spatial Data (Cont'd):** <u>Geospatial Linked Data</u> Introduction to research and techniques for creating and using geospatial linked data	Koubarakis et al. (2012); Parundekar et al. (2010); Janowicz et al. (2012)	- Group discussion based on reading - In-class quiz - Submit assignment 4 on the Blackboard no later than 11:59 p.m. on Mon., 10/8
Week 8 10/8	**Unstructured Spatial Data:** <u>Geocoding</u>	Bakshi et al. (2004); Goldberg & Cockburn (2010); Goldberg et al.	- Group discussion based on reading - In-class quiz

	Introduction to new methods and applications for linking addresses to locations Comparing geocoding applications and technologies	(2007, 2010); Davis et al. (2003); Zandbergen (2008)	- Submit assignment 5 on the Blackboard no later than 11:59 p.m. on Mon., 10/15
Week 9 10/15	**Unstructured Spatial Data (Cont'd):** <u>Linking Text to Location</u> Introduction to methods and applications for linking textual information to geographic locations	Knoblock (2012); Lieberman et al. (2007, 2010); Amitay et al. (2004); Quercini et al. (2010); Alex et al. (2015); Yuan (2010); Gelernter & Zhang (2013); Monteiro et al. (2016)	- Group discussion based on reading - In-class quiz - Student presentations on the initial final project ideas - Submit teams and propose team presentation topics on the Blackboard no later than 11:59 p.m. on Mon., 10/22
Week 10 10/22	**Discussion of Project Proposal:** Discussion and refinement of final project proposals and plan		- Student presentations on the refined final project ideas and plan - In-class quiz
Week 11 10/29	**Spatial Data Conflation:** <u>Registering and Aligning Geospatial Layers</u> Discussion of techniques for automatically aligning various geospatial layers, including both vector and raster layers	Chen et al. (2006, 2008); Wu et al. (2007); We et al. (2018)	- Group discussion based on reading - In-class quiz
Week 12 11/5	**Spatial Data Conflation (Cont'd):** <u>Digital Map Processing I</u> Introduction to methods for the extraction and recognition of geographic features from scanned raster maps	Chiang et al. (2014, 2016); Chiang & Knoblock (2014a, 2014b); Li et al. (2000); Kerle & de Leeuw (2009);	- Group discussion based on reading - In-class quiz
Week 13 11/12	**Spatial Data Conflation (Cont'd):** <u>Digital Map Processing II</u>	Leyk and Bosch (2010); Chiang (2015); Uhl et al. (2017, 2018); Duan et al. (2017, 2018)	- Group discussion based on reading - In-class quiz

	Introduction to methods for automatically processing large numbers of historical maps		
Week 14 11/19* **11/21-11/25 are university holidays**	**Advanced Spatial Computing Topics:** Spatial Data Mining, Reasoning, and Streaming Introduction to advanced techniques for handling spatial data, including spatial data mining, reasoning, and streaming	Shekhar et al. (2015); Gupta & Knoblock (2010); Michalowski & Knoblock (2005); O'Brien & Irvine (2004); Savopol & Armenakis (2002)	- Group discussion based on reading - In-class quiz
Week 15 11/26	**Final presentations:** Team presentations summarizing results and what was learned from the projects		- Team presentations
Final Examination 12/5 – 12/12	**Team Video presentation:** Online video presentations summarizing results and what was learned from the projects		- Team video presentations

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" https://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. https://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. http://www.suicidepreventionlifeline.org

Relationship & 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. https://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: 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. https://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. https://studentaffairs.usc.edu/bias-assessment-response-support/

Student Support & Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. https://studentaffairs.usc.edu/ssa/

Diversity at USC – https://diversity.usc.edu/
Tabs for Events, Programs and Training, Task Force (including representatives for each school), Chronology, Participate, Resources for Students

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.