



SSCI 591 – Web GIS (Section 35770) Course Syllabus Fall 2014

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I am always available asynchronously via email. I am also available for synchronous chats via phone or Skype, audio or video most days and times *by prior arrangement* via email. Or we can meet in my Adobe Connect room. Just get in touch!

Course Scope and Purpose

This course is designed as an introduction to Web GIS, to the programming concepts underlying construction and implementation of high quality web mapping applications. Instruction is provided in popular and commonly used open source and proprietary GIS and related programming tools for customizing web-based mapping applications and developing distributed web services for GIS. A thorough experience with proprietary web mapping software including Esri's ArcGIS Server and ArcGIS Javascript API is provided. You will gain an understanding of the concepts of programming web GIS applications, including integrating different types of spatial information into web-enabled GIS maps. Throughout the semester you will gain both an understanding and hands-on experience in working in local server architectures and cloud-based computing environments. We will cover three groups of topics as follows:

Web GIS Basics – This course begins by focusing on the basics of web GIS system architecture, geospatial web services and web mashups. In addition, we will explore the functionality of Web 2.0 technologies and geoportals, web mapping interoperability in terms of utilizing universal data standards such as OpenGIS, and the current state of e-business and e-government web mapping interests.

Software and Tutorials – This part of the course offers a semi-structured practical introduction to the wide variety of commonly used open source and proprietary web-based scripting and mapping environments and widely available Application Programming Interfaces (APIs), through a sequence of detailed tutorials, exercises and virtual seminars.

Web GIS Application Development – This is the hands-on portion of the course, where you will undertake an independent project that includes planning and creating an individual web GIS application, gathering and integrating data to support the intended capabilities, and implementing it on the web. The course then concludes with an overview of the new research frontiers and future trends in web GIS.



Learning Outcomes

When you have completed this course, you will be able to:

- Critically assess the benefits and challenges of developing Web GIS applications using different software technologies and system architectures, including local infrastructure versus cloud-based computing. This is learned through a combination of readings and computer-based exercises.
- Explain the difference between Web GIS, geospatial web services, mashups, geoportals, Volunteered Geographic Information (VGI) and Public Participation GIS (PPGIS), and how these are applicable to academia, e-business and e-government. This information is acquired through reading assignments and computer-based programming exercises.
- Evaluate current technologies, including various open source and proprietary Web GIS software that support Web GIS application development. This is experienced hands-on through computer-based exercises and the final project.
- Design and implement a unique web GIS application based on your own interests and goals in the course final project.

Course Formats

This is a graduate level course, so you should expect this class to be both academically robust and 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-level class, the instructor's role is that of a guide who keeps you on this path of discovery and collaborative learning with your fellow classmates. The challenge for us is to replicate such an academic experience within the milieu of "online learning".

All course materials will be organized through Blackboard. The main theoretical concepts will be provided through course notes and assigned readings. Hands-on practical exercises will use various software products accessible over the Internet. Assignments will give students an opportunity to internalize and apply the concepts and theory learned from the reading materials. Some assignments require group interaction, and all will benefit from it.

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, this course will be posted in your available courses no later than 12:00 noon, PT on the first day of class. 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 relevant to various sections of the course. These threads are very important in terms of providing support to each other while working on class exercises. Students share hints and helpful tips, as you would in a classroom laboratory. I check the discussion threads periodically and offer occasional comments. Please send me 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 desktops between two or more people.

Individual meetings – While Adobe Connect can be used for one-on-one meetings, we generally find it is 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 individual Virtual Machines (VMs) made available to students enrolled in this course. You will be provided access to your own personal VM after the course has begun. If you are unable to connect to your VM 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.-5:00 p.m. PT.

Assessment

Your grade in this class will be determined on the basis of several different assessment tools. Each week, by Monday, we will post a Weekly Assignment outlining the work you are expected to complete that week with the relevant due dates. Assignments will be due on the Friday following the week in which they are assigned.

Resume Assignment – 1 for a total of 2 points. We require all current students to post and maintain a public resume, short biography and recent photo on our shared GIST Student Community Blackboard site. With your permission, 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 used to promote our programs and more importantly, your skills, experience, and professional aspirations.

Reading Assignments – 6 for a total of 10 points. Each student is required to complete six reading assignments for this class. The weekly reading assignments will focus on the background and theory portion of the course. The objective of the assignments is to help you evaluate and integrate the information you have acquired from the course readings. Some reading assignments will involve discussions and collaborative work and some will be individual efforts.

Web & Web GIS Programming Exercises – 6 for a total of 35 points. Six exercises will be completed throughout the semester that involve the use of web and web map scripting. To demonstrate that you have completed each exercise, you will turn in a copy of digital output from the final part of the exercise such as a .jpg at a critical step, and/or some combination of a few brief text answers, your working script (programming code) or hyperlinks to your working web pages and applications.

Discussions – 4 for a total of 8 points. These conversations will utilize discussion forums and other interactive, asynchronous communication tools to focus on varying combinations of theory and practice and anticipate that you will post unique new messages (i.e. one per forum) and replies (i.e. two per forum) to messages posted by your classmates at designated times throughout the semester.

Final Web GIS Project – 6 components for a total of 45 points. The final project is your opportunity to integrate all that you have learned in the semester. Your Final Project will consist of six components: an initial proposal, a technology and data report, an



independently developed web GIS application, a short video recording illustrating your application's functionality, a final live project presentation and a final project report. The written proposal (5 points) will describe the web GIS application you intend to create, your proposed tools for implementation, and any potential challenges that you think could arise. The technology & data report (5 points) will describe the software tools you have chosen to implement and the spatial and non-spatial data you intend to utilize in your project. You will independently code a unique website and web GIS application (15 points), and produce a video recording demonstrating its full functionality (5 points). The final project report (10 points) will describe your experience including the application scenario you chose to address, your intended audience, a detailed description of how it was implemented, and lastly issues encountered while completing the project and how you overcame them. Your final project web GIS application must be operational and work as described in your final report. Your final project presentation (5 points) will be live via Adobe Connect and consist of slides illustrating highlights from the report followed by a live demonstration of your application.

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 591 course assignments and their point distribution:

Assignments	Number	Points Per Assignment	Total Points
Discussion Forums	4	2	8
Reading Assignments	6	1-2	10
Resume Assignment	1	2	2
Exercises	6	5-10	35
Final Projects:			
Proposal	1	5	5
Technology & Data Report	1	5	5
Application Implementation	1	15	15
Final Presentation & Demo	1	5	5
Final Project Recording	1	5	5
Final Project Report	1	10	10
Totals	16	-	100

Grades in this and other GIST courses will use the standard USC grading criteria, as follows:

A	≥ 93 points	B-	80-82 points	D+	67-69 points
A-	90-92 points	C+	77-79 points	D	63-66 points
B+	87-89 points	C	73-76 points	D-	60-62 points
B	83-86 points	C-	70-72 points	F	< 60 points

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.

Requirements

Textbooks – There are two textbooks required for this course. They are available from the USC Bookstore or online outlets such as Amazon. We encourage you to purchase these books quickly since you will need these materials from the opening day of class.

- Fu, P., and J. Sun. 2011. *Web GIS: Principles and Applications*. Redlands, CA: Esri Press.
- Svennerberg, G. 2010. *Beginning Google Maps API 3*. New York: Apress L.P.

Readings – To be posted to Blackboard under Course Documents:

- Berners-Lee, T. 1996. *The world wide web: past, present and future*. Cambridge, MA: Massachusetts Institute of Technology, Laboratory for Computer Science. <http://www.w3.org/People/Berners-Lee/1996/ppf.html> (last accessed April 20 2014).
- Jones, C. B., and R.S. Purves. 2008. Web-based GIS. In *The Handbook of Geographical Information Science*, eds. J. P. Wilson and A. S. Fotheringham, 559-580. Oxford: Wiley-Blackwell.
- Peng, Z.-R., and M.-H. Tsou. 2003. Quality of service and security issues in distributed GIS. In *Internet GIS: Distributed Geographic Information Services for the Internet and Wireless Network*, eds. Name., 500-533. New York: John Wiley and Son Inc.
- Zhao, P., T. Forester, and P. Yue. 2012. The geoprocessing web. *Computers & Geosciences* 47:3-12.
- Elwood, S., M. F. Goodchild, and D. Z. Sui. 2012. Researching volunteered geographic information: spatial data, geographic research, and new social practice. *Annals of the Association of American Geographers* 102 (3): 571-590.
- Lin, W. 2013. When Web 2.0 meets public participation GIS (PPGIS): VGI and spaces of participatory mapping in China. In *Crowdsourcing Geographic Knowledge: Volunteered Geographic Information (VGI) in Theory and Practice*, ed. D. Sui, S. Elwood and M.F. Goodchild, 83-103. New York: Springer.
- Camarero J., and C.A. Iglesias. 2009. Disasters2.0: application of Web2.0 Technologies in Emergency Situations. *International Journal of Emergency Management* 6 (3/4): 261-279.
- Goodchild, M. F. 2008. Spatial accuracy 2.0. In *Proceedings of the Eighth International Symposium on Spatial Data Accuracy Assessment in Natural Resources and Environmental Sciences (ACCURACY'08)*, Shanghai, China: 1–7.
- Holman, J. 2013. *Spatial career guide: 5 key skills for future GIS software developers*. Geographical perspectives. Pueblo, CO: Colorado State University, Hasan School of Business. <http://www.justinholman.com/2012/03/29/spatial-career-guide-5-key-skills-for-future-gis-software-developers/> (last accessed April 20 2014).



Technology – There are several technology requirements:

- An up-to-date computer with a fast Internet connection, such as DSL or equivalent.
- A functional webcam together with a microphone or headset for meetings.
- A modern web browser (Firefox recommended) to run ArcGIS, which is provided online via the GIST Server, as well as on the VMs; you do *not* need to install it on your own computer.

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 the Blackboard Assessment link. I will also create Blackboard discussion forums throughout the semester that we will use for the aforementioned assignments and so we can discuss issues and comments on 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 (jswift@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.

Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to an instructor as early in the semester as possible. DSP is located in STU 301 and is open from 8:30 a.m. to 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles.



Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A (see http://scampus.usc.edu/wp-content/uploads/2011/07/university_governance.pdf for additional details). Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at <http://www.usc.edu/student-affairs/SJACS/>.

Important Administrative Dates

- 8/25: Fall semester classes begin
- 9/1: Labor Day, university holiday
- 9/12: Last day to register and add classes
- 9/12: Last day to change enrollment option to Pass/No Pass or Audit
- 9/12: Last day to drop a class without a mark of "W" and receive a 100% refund
- 11/14: Last day to drop a class with a mark of W
- 11/26-29: Thanksgiving recess, university holiday
- 12/5: Fall semester classes end
- 12/6-9: Study days
- 12/17: Final Examinations end
- 12/18-1/11: Winter Recess

*<http://classes.usc.edu/term-20143/calendar/>



Tentative Schedule (35770)

Week #	Week Begins	Theme	Week's Readings	Assignments Due Monday Following				
			Reading	Reading Assign.	Discuss.	Hands-On Assign.	Meetings and Reports	
1	8/25	Introduction	Fu&Sun 1, Notes, article	R1		1	Resume	
2	9/2*	Web Page Basics	Notes			2		
3	9/8	Continued...	Article		D1			
4	9/15	Web Mapping Basics	Fu&Sun 2, Notes, Svenner 1,3-6	R2		3		
5	9/22	Continued...	Svenner 7-10, Article		D2		Individual Meetings	
6	9/29	Geospatial Web Services	Fu&Sun 3, Notes	R3		4		
7	10/6	Continued...	Articles		D3			
8	10/13	Geospatial Mashups	Fu&Sun 4, Notes, article	R4		5		
9	10/20	Geoportals & NSDI	Fu&Sun 6,7, Notes, article	R5			Proposal	
10	10/27	Web GIS Applications	Fu&Sun 8, Notes			6		
11	11/3	Continued...	Fu&Sun 9		D4			
12	11/10	The future of Web GIS	Fu&Sun 10, Notes, Articles	R6				
13	11/17							Tech & Data Report
14	11/24	Thanksgiving break (11/26-29)						
15	12/1							Application & Presentation
**	12/5	All of your work must be submitted by 5:00 p.m. on this date						Final Project & Recording

* Monday September 1 is a university holiday

**Dec. 5 End of semester