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

SSCI 591, Web GIS

Syllabus

Units: 4

Term — Day — Time: Fall, 2020, Wednesdays and Fridays, 1:00-2:50 PM PT

This class will be offered in a hybrid format. Lectures will be offered in person and streamed for remote access for maximum options and accessibility.

Location: SOS B2 & Online

Instructor: Jennifer N Swift, Ph.D. GISP
Office: AHF B57D
Regular Office Hours: Tues and Thurs 5-6 pm PT. Also available most days and times by appointment via email.
Contact Info: jswift@usc.edu, 213-740-5841,
Zoom: Provided via Blackboard

Library Help: Andy Rutkowski
Office: VKC 36B
Office Hours: Tue 10 am-12 pm and Thurs 4:30-5:30 pm 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: spatial_support@usc.edu, 213-821-4415

Course Scope and Purpose

The main goal of this course is to help you become comfortable with building web-based mapping applications. Today, the ability to construct and implement of high-quality web GIS applications is a critical asset for in a variety of disciplines and industries. Learning to program innovative web-based mapping applications facilitates dissemination of your work, and at the same time expands your overall application development skillset. Familiarity with web scripting languages and how these are utilized to implement web GIS applications provides in-depth insight into how many government and commercial organizations, as well as individuals, develop these tools.

This course will use modern software tools and information to develop and implement customized web GIS applications, and introduce you to mobile GIS application development concepts. The students taking this course have varying levels of prior programming experience and may be new to web scripting and web GIS application development. Essential practical, as well as theoretical concepts of web and mobile GIS, are covered. You will learn to develop applications through popular platforms such as ArcGIS and Google Maps, and use various Application Programming Interfaces (APIs). You will learn the fundamentals of web GIS system architecture, optimization for mobile GIS, web mashups, and distributed geospatial web services. Experience using Web 2.0 technologies that focus on user-generated content, geoportals for finding and accessing geospatial information, and web mapping interoperability in terms of utilizing open source universal data standards is also provided. In addition, the essentials of user experience and user interface design (UX/UI) are covered, including their importance in e-business and e-government web mapping interests.

By both necessity and design, this course serves several different audiences. This class is an elective for the Geographic Information Science & Technology M.S. and Graduate Certificate Programs, in the Geospatial Leadership Graduate Certificate Program, in the Remote Sensing for Earth Observations Graduate Certificate Program, and in the Spatial Data Science M.S. Program.

Learning Outcomes

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

- Recognize different web scripting languages commonly used in web GIS application development and use several of these technologies to extend open source and proprietary GIS software functionality.
- Critically evaluate the benefits and challenges of developing web GIS applications using different software technologies and system architectures, including local infrastructure versus cloud-based computing.
- Explain how web and mobile GIS technologies are applicable to academia, e-business, and e-government.
- Identify web and mobile map application design problems and solutions in order to make end user experiences and interfaces easy to use and aesthetically pleasing.

- Solve application development challenges, such as debugging scripts and integrating disparate code modules together into single applications.

Prerequisite(s): None
Co-Requisite (s): None
Recommended Preparation: SSCI 581: Concepts for Spatial Thinking

Harassment, sexual misconduct, interpersonal violence, and stalking are not tolerated by the university. All faculty and most staff are considered Responsible Employees by the university and must forward all information they receive about these types of situations to the Title IX Coordinator. The Title IX Coordinator is responsible for assisting students with supportive accommodations, including academic accommodations, as well as investigating these incidents if the reporting student wants an investigation. The Title IX office is also responsible for coordinating supportive measures for transgender and nonbinary students such as faculty notifications, and more. If you need supportive accommodations you may contact the Title IX Coordinator directly (titleix@usc.edu or 213-821-8298) without sharing any personal information with me. If you would like to speak with a confidential counselor, Relationship and Sexual Violence Prevention Services (RSVP) provides 24/7 confidential support for students (213-740-9355 (WELL); press 0 after hours).

SSI Server and Tech Support

This course utilizes the SSI Server which is a virtual desktop giving access to many different professional software programs. If you are unable to connect to the server or experience any type of technical issue, send an email using your USC account to SSI Tech Support at spatial_support@usc.edu**,** making sure to copy (cc) your instructor on the email.

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.

Required Readings and Supplementary Materials

The required textbooks for this course are:

- Fu, Pinde, and Jiulin Sun. 2011. *Web GIS: Principles and Applications*. Redlands, CA: Esri Press, 296 pp. ISBN 9781589482456
- Fu, Pinde. 2020. *Getting to Know Web GIS*. 4th ed., Redlands, CA: Esri Press, 490 pp. ISBN 978-1589485921

Supplementary readings will be assigned from various sources including but not limited to:

- Goodchild, Michael F. 2008. Spatial accuracy 2.0. In *Proceedings of the 8th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences*, edited by Michael F. Goodchild and Jingxiong Zhang, 1-7 Edgbaston, UK: World Academic Press. Retrieved from http://www.geog.ucsb.edu/~good/papers/453.pdf
- Holman, Justin. 2012. Spatial Career Guide: 5 Key Skills for Future GIS Software Developers. Retrieved from http://www.justinholman.com/2012/03/29/spatial-career-guide-5-key-skills-for-future-gis-software-developers/
- Roth, Robert. 2015. Interactivity and cartography: A contemporary perspective on user interface and user experience design from geospatial professionals. *Cartographica* 50(2): 94-115
- Zhao, Peisheng, Theodore Forester, and Peng Yue. 2012. The geoprocessing web. *Computers & Geosciences* 47:3-12

You will also conduct online library research to find articles that apply specific techniques in an application area of your choice for several of the assignments in this course.

Description and Assessment of Assignments

This course includes a diversity of assessments that allow students to gain knowledge and experience and to show their mastery of the material in a variety of ways. The different types of assessments are described below and their overall point value to are summarized in the following Grading Breakdown section.

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.

Projects - 5 worth a total of 60 points. These assignments require students to complete the basic types of programming projects asked of professional web GIS application developers in real world settings. Prompts will list helpful information, such as Esri, JavaScript tutorials, for becoming familiar with ways that concepts learned in the course are implemented in various geospatial software packages, but the deliverables will be final written summaries of the students' goals, methods, data, and results for each project.

Reading and Research Discussions - 4 worth a total of 16 points. These assignments call on students to identify relevant research case studies employing the methodologies and concepts we cover in class and to discuss them with the instructor and their classmates during course meetings and in online discussion forums.

Final Exam - 1 worth 22 points. The final exam will cover material learned throughout the duration of the semester. It may be mixed format and may consist of multiple choice, short answer, and simple problem questions.

Grading Breakdown

Assessment	Number	Points Each	Total Points
Weekly Assignments			
Resume Assignment	2	1	2
Reading and Research Assignments	4	4	16
Projects	5	12	60
Final	1	22	22
Total	12		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.

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.
- No work will be accepted for grading after 5 pm on the last day of classes.

Weekly Course Breakdown

Week	Topic	Assignments	Deliverables: Due Dates
Module 1 | Introduction to Internet Scripting for Web GIS			
Week 1 8/24	Introduction to the Course and Building Web Pages	Resume Assignment Reading & Research Discussion (RRD) 1	
Week 2 8/31	Basic Internet Scripting with JavaScript	Project 1	Resume Assignment 1: 8/31

Week	Topic	Assignments	Deliverables: Due Dates
Week 3 9/8* 9/7 is a university holiday	Using the JavaScript Library		RRD1: 9/8
Module 2 | Fundamentals of Web Maps, Applications, and Services			
Week 4 9/14	Geospatial Web Services, Web Maps, Apps, and Dashboards	Project 2	Project 1: 9/14
Week 5 9/21	Raster and Geoprocessing Services in Web GIS Apps and Notebooks	RRD2	
Module 3 | Web GIS API's			
Week 6 9/28	Sharing Data and Code: Mashups, Geoportals and NSDI	Project 3	Project 2: 9/28
Week 7 10/5	Introduction to Web GIS APIs	RRD3	RRD2: 10/5
Week 8 10/12	Coding with Google Maps and Other Web GIS API'S		
Module 4 | Web GIS Applications for Mobile Devices			
Week 9 10/19	User Experience/User Interface (UX/UI) Design	Project 4	Project 3: 10/19
Week 10 10/26	Building Web GIS applications for mobile devices	RRD4	RRD3: 10/26
Module 5 | Web GIS Application Development in the Cloud			
Week 11 11/2	Cloud-Based Infrastructure	Project 5	Project 4: 11/2
Week 12 11/9	Developing Web GIS Applications in the Cloud		RRD4: 11/9

Week	Topic	Assignments	Deliverables: Due Dates
Week 13 11/16	Future challenges for Web and Mobile GIS Programmers		Resume Assignment 2: 11/16
Week 14* 11/23 *11/25-11/27 is a university holiday	Final Exam Review		Project 5: 11/23
Final Exam (Asynchronous – Date TBD)			

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
engemannshc.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline – 1 (800) 273-8255 – 24/7 on call
www.suicidepreventionlifeline.org
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call
studenthealth.usc.edu/sexual-assault/
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 |Title IX Compliance - (213) 821-8298
eeotix.usc.edu/
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic that may be specified in applicable laws and governmental regulations.

Reporting Incidents of Bias or Harassment- (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs – (213) 740-0776
dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy – (213) 821-4710
campussupport.usc.edu/
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC – (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety – UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.

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. These include instructional videos, remote access to university resources, and other key contact information for distance students.