

USCDornsife

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

SSCI 572, GIS and Landscape Architecture

Syllabus

Units: 2

Term Day Time: Fall 2020, Wednesday, 10:00 – 11:50 a.m.

Location: Online

Instructor: Leilei Duan, Ph.D.

Office: AHF B55G

Office Hours: Monday 10:30 – 11:30 a.m., Wednesday 9:00 – 10:00 a.m. Also available by appointment via email.

Contact Info: leileidu@usc.edu, 213-740-6532

Library Help: Andy Rutkowski

Office: VKC 36B

Office Hours: Tuesdays 10 a.m. – 12 pm; Thursdays 4:30-5:30 p.m. Also available by appointment via email.

Contact Info: arutkows@usc.edu, 213-740-6390,
<http://bit.ly/andyhangout>

IT Help: Richard Tsung

Office: AHF 55E

Office Hours: By appointment

Contact Info: ctsung@usc.edu, 213-821-4415 (office)

Course Description

This course explores the use of geographic information science, systems and services to support landscape architecture projects. The topics in the first part of the course will cover the role of spatial thinking in geography, planning and design, the special characteristics of spatial information, and the role of the vector and raster data models in spatial data capture, analysis, modeling and mapping. These topics provide the platform to explore the use of spatial methods and data to model the built and social environments on the one hand and hydrological and ecological systems on the other hand. The course will conclude with an examination of the use of GPS and GIS apps to collect digital data with geographic coordinates in the field.

Modern-day GIS (geographic information systems) serve as systems of record, systems of insight, and systems of engagement and as a result, they serve as extensions of the Grasshopper, Rhino and other spatial tools that traditionally, have supported landscape architecture projects. This course will show how all of these systems complement one another and how GIS can promote and provide data-driven spatial analysis and modeling to support the design, approval, implementation, and performance phases of landscape architecture projects that span multiple spatiotemporal scales.

Learning Objectives

Upon successful completion of this course, a student will be able to:

- Identify the ways in which GIS can be used to support spatial thinking, analysis, modeling and mapping;
- Explain the special characteristics of spatial information and the raster and vector data models that are typically used to represent real-world phenomena;
- Describe the ways in which the built and social environments can be modeled using GIS;
- Describe the ways in which hydrological and ecological systems can be modeled using GIS;
- Use GPS and GIS apps to gather their own spatial information; and
- Employ spatial models and basic cartographic principles to communicate the results of landscape architecture projects and any associated research.

Prerequisite(s): None

Co-Requisite(s): None

Class Conduct

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).

Required Readings and Supplementary Materials

All of the readings listed below are available online through USC Libraries or under the tab marked "Readings" on the course Blackboard. There is no required textbook for this course.

- Bolstad, P. (2019). *GIS fundamentals: A first text on geographic information systems* (6th Ed.). Ann Arbor, MI: XanEdu Publishing [Ch. 2 only].
- Carstens, A. (2019). BIM & GIS – New Dimension of Improved Collaboration for Infrastructure and Environment. *Journal of Digital Landscape Architecture*, 114 - 121.
- Cutter, S. L., Boruff, B. J., & Shirley, W. L. (2003). Social vulnerability to environmental hazards. *Social Science Quarterly*, 84(2), 242-261.
- Dangermond, J., & Goodchild, M. F. (2020). Building geospatial infrastructure. *Geo-spatial Information Science*, 23, in press.
- Downs, R. M. (1997). The geographic eye: Seeing through GIS? *Transactions in GIS*, 2, 111-121.
- Duckham, M. (2015). GI expertise. *Transactions in GIS*, 19, 499-515.
- Ervin, S. (2018). Sensor-y Landscapes: Sensors and Sensations in Interactive Cybernetic Landscapes. *Journal of Digital Landscape Architecture*, 96 – 106.
- Gorelick, N., Hancher, M., Dixon, M., Ilyushchenko, S., Thau, D., & Moore, R. (2017). Google Earth Engine: Planetary-scale geospatial analysis for everyone. *Remote Sensing of Environment*, 202, 18-27.
- Jones, K. K., Zenk, S. N., Tarlov, E., Powell, L. M., Matthews, S. A., & Irina Horoi, I. (2017). A step-by-step approach to improve data quality when using commercial business lists to characterize retail food environments. *BMC Research Notes*, 10, 35.
- Milly, P. C. D., Betancourt, J., Falkenmark, M., Hirsch, R. M., Kundzewicz, Z. W., Lettenmaier, D. P., & Stouffer, R. J. 2008. Stationarity is dead: Whither water management? *Science* 319, 573-574.
- Murtha, T., Golden, C., Cyphers, A., Klippel, A., & Flohr, T. (2018). Beyond Inventory and Mapping: LIDAR, Landscape and Digital Landscape Architecture. *Journal of Digital Landscape Architecture*, 249-259.
- Parker, J., & Zingoni de Baro, M. E. (2019). Green infrastructure in the urban environment: A systematic quantitative review. *Sustainability*, 11, 3182.
- Perkl, R. M. (2016). Geodesigning landscape linkages: Coupling GIS with wildlife corridor design in conservation planning. *Landscape and Urban Planning*, 156, 44-58.

- Ravanelli, R., Nascetti, A., Cirigliano, R. V., Di Rico, C., Monti, P., & Crespi, M. (2018). Monitoring of the urban heat island through Google Earth Engine: A global methodology and its application to different cities of the United States. *International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences*, 42(3), 1467-1472.
- Robertson, C., & Feick, R. (2018). Inference and analysis across spatial supports in the big data era: Uncertain point observations and geographic contexts. *Transactions in GIS*, 22, 455-476.
- Singh, G. K., Daus, G. P., Allender, M., Ramey, C. T., Martin, Jr., E. K., Perry, C., De Los Reyes, A. A., & Vedamuthu, I. P. (2017). Social determinants of health in the United States: Addressing major health inequality trends for the nation, 1935-2016. *International Journal of MCH and AIDS*, 6, 139-164.
- Stöglehnergernot, G. (2019). Conceptualizing quality in spatial planning. *Spatial Research & Planning*, 77(1), 1-15.
- Wilson, J. P. (2012). Digital terrain modeling. *Geomorphology*, 137(1), 107-121.
- Wilson, J. P. (2018). *Environmental applications of digital terrain modeling*. Oxford, UK: Wiley Blackwell [Ch. 3, 4 only].
- Yin, L., & Shiode, N. (2014). 3D spatial-temporal GIS modeling of urban environments to support design and planning processes. *Journal of Urbanism: International Research on Placemaking & Urban Sustainability*, 7, 152-169.
- Zuniga-Teran, A. A., Staddon, C. de Vito, L., Gerlak, A. K., Ward, S. Schoeman, Y., ... Booth, G. (2020). Challenges of mainstreaming green infrastructure in built environment professions. *Journal of Environmental Planning & Management*, 63, 710-732.

Description and Valuation of Assessments

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

Projects

A set of four projects is spread across the semester. The “hands-on” tasks that comprise these projects will introduce the tools of scientific inquiry and give students practical experience in implementing these tools within the framework of the scientific method and typical landscape architecture settings. The projects are linked to the lectures and class discussions, but do not duplicate the lecture experience.

The geographic analysis and mapping software and geospatial data required for the projects will be accessed using virtual computing resources provided by the Spatial Sciences Institute.

Final Exam and Other Policies

The final exam is closed book. This exam will cover content learned during lecture as well as in the course readings and homework packets.

No make-up opportunities will be offered for the final exam, so mark the appropriate date on your calendar! If you have a legitimate conflict, per the USC policy on Final Exam Scheduling, speak with me as soon as possible. In addition, please note that there is **no credit for late assignments**.

Grading Breakdown

The table below shows the breakdown of the assessments and their weight in the final grade. The emphasis is on completing the three projects as well as solid performance on the final examination.

Assessment	Number	Points Each	Total Points (% of Grade)
Projects	3	20 - 35	70
Final Exam	1	30	30
Totals	4	--	100

Schedule

Date	Topics	Readings	Deliverables/Due Dates
Module 1 Guiding Principles			
Week 1			
8/19	What is GIS?	Dangermond & Goodchild (2020); Carstens (2019)	
Week 2			
8/26	Review software system	Murtha et al. (2018); Ervin (2018)	Project #1: Getting to Know ArcGIS Pro (Due Monday, 10/5, 11:59 p.m.)
Week 3*			
9/2 *Monday 8/31 is Labor Day	Thinking Spatially	Downs (1997); Duckham (2015)	
Week 4			

9/9	Spatial Data Models	Bolstad (2019), Ch. 2	
Week 5			
9/16	Special Characteristics of Spatial Information	Milly et al. (2008); Robertson & Feick (2018)	
Week 6			
9/23	Review of Geographic Information Sources	Gorelic et al. (2017)	
Module 2 Built Environment and Social Characteristics			
Week 7			
9/30	3D Building Models	Yin & Shiode (2014)	Project #2 Modeling the Built and Social Environments (Due Monday, 10/26, 11:59 p.m.)
Week 8			
10/7	Social Characteristics	Cutter et al. (2003); Singh et al. (2017)	
Week 9			
10/14	Urban Activity and Spatial Planning and Design	Jones et al. (2017); Stöglehnergernot (2019)	
Module 3 Hydrological and Ecological Characteristics			
Week 10			
10/21	Primary Land Surface Parameters	Wilson (2012); Wilson (2018), Ch. 3	Project #3 Modeling Hydrological and Ecological Systems (Due Monday, 11/16, 11:59 p.m.)
Week 11			
10/28	Secondary Land Surface Parameters	Wilson (2012); Wilson (2018), Ch. 4	
Week 12			

11/4	Green Infrastructure and Spatial Ecological Models	Parker & Zingoni de Baro (2019); Perkl, R. M. (2016); Ravanelli et al. (2018); Zuniga-Teran et al. (2020)	
Week 13			
11/11	Future of Geographic Information Science, Systems, and Services	Gahegan (2018)	
Final Examination (Date and Time TBD; Closed Book)			

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
engemannshc.usc.edu/rsvp

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
equity.usc.edu, titleix.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.

Bias Assessment Response and Support – (213) 740-2421

studentaffairs.usc.edu/bias-assessment-response-support

Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation 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.

Student Support and Advocacy – (213) 821-4710

studentaffairs.usc.edu/ssa

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.