

**USC**Dornsife

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 2021, Thursdays, 12:00 a.m. to 1:50 p.m. PT.

**Location:** TBD

**Instructor:** Leilei Duan

**Office:** AHF B55G

**Office Hours:** Monday 2:00 – 3:00 p.m. PT and Thursday 10:30 – 11:30 a.m. PT, and by appointment via email.

**Contact Info:** [leileidu@usc.edu](mailto:leileidu@usc.edu), 213-740-6532 (office), see contact page on Blackboard for Zoom Room

**Library Help:** Andy Rutkowski

**Office:** VKC 36B

**Office Hours:** Thu 10 a.m.-12 p.m.

**Contact Info:** [arutkows@usc.edu](mailto:arutkows@usc.edu), see contact page on Blackboard for Zoom Room

**IT Help:** Richard Tsung

**Office:** AHF 145D

**Office Hours:** By appointment

**Contact Info:** [spatial\\_support@usc.edu](mailto:spatial_support@usc.edu), 213-821-4415

## 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.

Students may vary in their competency levels on these abilities. You can expect to acquire these abilities only if you honor all course policies, attend classes regularly, complete all assigned work in good faith and on time, and meet all other course expectations of you as a student.

**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](mailto: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)

## Technological and Communication Requirements

ArcGIS is provided online via the GIST 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 Server

If a student does not have access to any of these, please speak with the instructor at the start of the semester. Also, see the USC ITS Student Toolkit here:

<https://keepteaching.usc.edu/students/student-toolkit/>

*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](mailto: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 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.

## 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].
- 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. *Geospatial 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.
- 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.
- Parker, J., & Zingoni de Baro, M. E. (2019). Green infrastructure in the urban environment: A systematic quantitative review. *Sustainability*, 11, 3182.
- 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. (2018). *Environmental applications of digital terrain modeling*. Oxford, UK: Wiley Blackwell [Ch. 6 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.

### **Homework Packets**

A set of four homework packets is spread across the semester. The “hands-on” tasks that comprise these homework packets 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 homework packets 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 homework packets 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 regularly completing a number of short assignments as well as solid performance on the final examination, policy essay, and Story map project.

| Assessment | Number | Points Each | Total Points<br>(% of Grade) |
|------------|--------|-------------|------------------------------|
| Projects   | 4      | 15-25       | 70                           |
| Final Exam | 1      | 30          | 30                           |
| Totals     | 5      | --          | 100                          |

## Schedule

| Date   | Topics   | Readings  | Deliverables/Due Dates   |
|--|--|---|--|
| <b>Module 1   Guiding Principles</b>                           |  |   |  |
| <b>Week 1</b>  |  |   |  |
| 8/26   | What is GIS?                                   | Dangermond & Goodchild (2020)                   |  |
| <b>Week 2</b>  |  |   |  |
| 9/2  | Review software system                         | Murtha et al. (2018); Ervin (2018)              | <b>Project #1:</b> Getting to Know ArcGIS Pro (Due Monday, 10/4, 11:59 p.m.) |
| <b>Week 3</b>  |  |   |  |
| 9/9  | Thinking Spatially                             | Downs (1997); Duckham (2015)                    |  |
| <b>Week 4</b>  |  |   |  |
| 9/16   | Special Characteristics of Spatial Information | Milly et al. (2008)<br>Robertson & Feick (2018) |  |
| <b>Week 5</b>  |  |   |  |
| 9/23   | Spatial Data Models                            | Bolstad (2019), Ch. 2                           |  |
| <b>Week 6</b>  |  |   |  |
| 9/30   | Review of Geographic Information Sources       | Gorelic et al. (2017)                           |  |
| <b>Module 2   Built Environment and Social Characteristics</b> |  |   |  |
| <b>Week 7</b>  |  |   |  |
| 10/7   | 3D Building Models                             | Yin & Shiode (2014)                             | <b>Project #2</b>  |

|   |  |   |  |
|---|--|---|--|
|   |  |   | Modeling the Built and Social Environments<br>(Due Monday, 10/25, 11:59 p.m.)                        |
| <b>Week 8</b>   |  |   |  |
| 10/14*  | *no class – university holiday                 |   |  |
| <b>Week 9</b>   |  |   |  |
| 10/21   | Social Characteristics                         | Cutter et al. (2003); Singh et al. (2017)   |  |
| <b>Week 10</b>  |  |   |  |
| 10/28   | Urban Activity and Spatial Planning and Design | Jones et al. (2017); Stöglehnergernot (2019)  | <b>Project #3</b><br>Modeling Hydrological and Ecological Systems<br>(Due Monday, 11/15, 11:59 p.m.) |
| <b>Module 3   Hydrological and Ecological Characteristics</b> |  |   |  |
| <b>Week 11</b>  |  |   |  |
| 11/4  | Green Infrastructure                           | Parker & Zingoni de Baro (2019); Perkl, R. M. (2016); Ravanelli et al. (2018); Zuniga-Teran et al. (2020) |  |
| <b>Week 12</b>  |  |   |  |
| 11/11   | Primary Land Surface Parameters                | Wilson (2012)<br>Wilson (2018, Ch. 3)   |  |
| <b>Week 13</b>  |  |   |  |
| 11/18   | Secondary Land Surface Parameters              | Wilson (2012)<br>Wilson (2018, Ch. 4)   | <b>Project #4</b><br>Spatial Data Acquisition<br>(Due Monday, 12/6, 11:59 p.m.)                      |
| <b>Week 14</b>  |  |   |  |
| 11/25*  | *no class – university holiday                 |   |  |
| <b>Week 15</b>  |  |   |  |

|   |   |                |  |
|---|---|----------------|--|
| 12/2  | Future of Geographic Information Science, Systems, and Services | Gahegan (2018) |  |
| <b>Final Examination (Date and Time TBD; AHF 145D; Closed Book)</b> |   |                |  |

## 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/files/2020/07/SCampus-Part-B-1.pdf>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, [policy.usc.edu/scientific-misconduct](https://policy.usc.edu/scientific-misconduct).

### **Support Systems**

*Counseling and Mental Health* – (213) 740-9355 – 24/7 on call  
[engemannshc.usc.edu/counseling](https://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](http://www.suicidepreventionlifeline.org)

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) 740-9355(WELL), press “0” after hours – 24/7 on call  
[studenthealth.usc.edu/sexual-assault](https://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  
[equity.usc.edu](https://equity.usc.edu), [titleix.usc.edu](https://titleix.usc.edu)

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

*Reporting Incidents of Bias or Harassment* – (213) 740-5086 or (213) 821-8298

[usc-advocate.symplcity.com/care\\_report](https://usc-advocate.symplcity.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](https://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 Campus Support and Intervention – (213) 821-4710*

[campussupport.usc.edu](https://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](https://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](https://dps.usc.edu), [emergency.usc.edu](https://emergency.usc.edu)

Emergency assistance and avenue to report a crime. Latest updates regarding safety, 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](https://dps.usc.edu)

Non-emergency assistance or information.