PPD 631: Geographic Information Systems for Policy, Planning and Development

Spring 2021

(2 units)

Section:	51203R	
Time:	Wednesday 12:00 – 1:50 p.m.	

Location: ONLINE

Instructor: Mark Hanson, mhanson@usc.edu

Office hours: TBD

> *Computers and software—especially GIS software—are increasingly being used in planning; therefore, candidates with strong computer skills and GIS experience will have an advantage in the job market.* (Bureau of Labor and Statistics, *Occupational Outlook Handbook*)

This course recognizes the growing importance and variety of Geographic Information System (GIS) applications in use today and intends to augment students' skillsets to increase their job prospects and enhance their work. In this class, students will be exposed to GIS concepts, methods and available tools, and real-world examples. Students will start working with GIS software right away, completing hands-on training exercises using industry standard software and complete homework that reinforces essential GIS skills. From the first day of class, students will be encouraged to imagine ways to incorporate GIS with their interests (the instructor will help), enhance spatial analytic and visualization technique, while also keeping in mind a variety of additional considerations that will help students more effectively apply GIS methods in practice. Students will present projects of their own design and receive constructive feedback from their classmates.

Some students will begin this course with considerable GIS experience. Some will begin with little or none (but will bring other important skills and experiences that will enhance their work and benefit the class.) This course is intended to accommodate students at all levels. The instructor will seek to personalize students' learning as much as possible and advance students' skills and understanding from wherever they are. By the end of this course, students will:

- Better understand how spatial concepts can illuminate real-world problems and how GIS can serve as a powerful analysis and communication tool;
- Become more skilled in gathering, analyzing, and presenting spatial data using industry standard software;

- Better understand how theoretical and practical considerations may impact decisions to employ GIS in research and practice;
- Complete a GIS project on a topic of interest; and
- Share with classmates their growing GIS knowledge and abilities related to planning and policy.

Materials

Students must have access to a computer and the Internet to receive class updates and materials from the instructor sent to their USC email address, and to submit written assignments. Some assignments will require using standard Microsoft Office programs (i.e., Word, Excel, and PowerPoint) and software that can generate .pdf documents (e.g. Adobe Acrobat, latest Microsoft Office.) Students must have a computer capable of running the Windows program, ArcGIS, which is available for purchase at discount.

We will consult a variety of texts in this course. These will be assembled and distributed by the instructor according to fair use law, and at no charge to students.

Considerable time will be spent learning to use ESRI's ArcGIS, currently the industry-standard GIS software. Most in-class demonstrations will be about a feature of ArcGIS, and students will complete trainings using ArcGIS. Most students will choose to do their final projects using ArcGIS. USC students with valid student ID can obtain a 12-month copy of ArcGIS 10.8 for $50 via electronic download from the GIS Research Lab. Installation instructions are available from Stephanie Tran (transtep@usc.edu). A free, 21-day trial version of the latest version of ArcGIS is also available for download at http://www.esri.com/software/arcgis/arcgis-for-desktop/free-trial.

Note: If you are experiencing technical difficulties with ArcGIS installation, trainings, or using ArcGIS more generally, first ask the instructor for help. In some cases, you may be referred to Richard Tsung (ctsung@usc.edu) at USC's Spatial Science Institute (SSI). Because SSI is an ESRI Development Center, which affords USC benefits like discounted software, it is important that we follow this protocol. Only after trying to get help in this manner are USC students and staff supposed to contact ESRI Technical Support directly.

Note to Mac Users: ArcGIS is a Window-based software program. The Windows operating system must be installed and running before ArcGIS can be installed and run on a Mac. Windows can be run either by booting into Windows at startup (using BootCamp), or by using virtualization software (e.g., Parallels or Fusion) which allows OS X and Windows to run simultaneously. Many functions of ArcGIS are found by the right-click of a mouse. This is a two-finger click on a Mac trackpad.

Assignments and grading

Course grades will be derived from student performance on assignments as follows:

- Student profile
- Homework on readings, lectures, and/or trainings (30%)
- Student project (70%)
    - Concept paper (10%)

- Analysis plan (25%)
- Project report (35%)

Student profile

Planning and policy students come from a variety of academic and professional backgrounds. GIS applications are many and changing. No two PPD 631 classes have been exactly alike. To better understand the interests of students in this class, and to better tailor teaching to student needs, a student profile should be completed and submitted to the instructor.

Homework exercises

Brief homework exercises will help the instructor monitor student progress on grasping concepts presented in class, reinforce student learning, and help the instructor refine his teachings as the semester unfolds. Responses to questions will be submitted as directed by the instructor. The quality of responses will determine this component of course grades.

ESRI provides a wide variety of online training courses through its Virtual Classroom, many for free. This class introduces students to this valuable resource, and helps them complete select training modules that will help them master course material and complete their projects. Completing two ESRI training courses is part of the homework for this class. Previous students have endorsed these:

- Getting Started with GIS (4 hrs)
- Getting Started with ArcMap: Map the impact of roads on deforestation in the Amazon
- Telling Stories with GIS Maps
- Getting Started with Mapping and Visualization
- Exploring GIS Maps
- Getting Started with Spatial Analysis
- Getting Started with Story Maps

Student projects

Each student will complete a project. There will be several deliverables related to the projects (concept paper, project seminar, analytic plan, presentation and evaluations, described further below.) Students should begin to think about their projects from the first day of class (or before), discussing with the instructor and classmates regularly to refine their thinking as they become more familiar with GIS concepts, available data, and software capabilities. Students should strive to make steady progress towards completing their projects by the end of this course.

As an initial step, students will submit **concept paper**s for their proposed projects. The concept paper will give a brief overview of (a) *what* the project is about, (b) *where* attention will be focused, and (c) generally *how* it will be completed using GIS, including a brief description of methods and data needs if known. Instructor approval of the concept is required before continuing with the project.

Next, each student will submit a detailed **analysis plan** for their project. The plan will outline especially the data and methods to be employed. Students will share their project concepts and analytic plans and receive additional feedback. Feedback will focus on aspects of projects where students appear to be most "stuck" (e.g. finding data, selecting a method, an interesting study area, a way to present results, etc.)

Analytic work on student projects will continue over a number of weeks, leading to an updated version of projects, including results of their analyses.

Finally, students will submit a written **report**. The format of the report will be as an annotated PowerPoint presentation, converted to .pdf and submitted electronically.

University 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 Section 11, Behavior Violating University Standards https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions. 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.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity http://equity.usc.edu or to the Department of Public Safety http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

Weekly schedule and deliverables

Week	Date[2]	Topics	Weekly activities	Deliverables[1]	(Due[2])
1	1/20	Introductions; GIS, planning, and GIS in planning	Install software; get ESRI ID	Student profile	(1/22)
2	1/27	Spatial data, models, inference and uncertainty	Generate project ideas; begin first homework		
3	2/3	Essential skills, part 1	Research project ideas; complete first homework	HW#1	(2/5)
4	2/10	Essential skills, part 2	Refine ideas; search for data	Concept paper	(2/12)
5	2/17	Essential skills, part 3	Begin second homework		
6	2/24	Essential skills, part 4	Refine ideas, including methods		
7	3/3	Design guidelines	Complete second homework	HW#2	(3/5)
8	3/10	Open lab[3]	Collect data		
9	3/17	Open lab[3]	Collect data; decide method	Analysis plan	(3/19)
11	3/24	Open lab[3]	Project work; share interim results		
12	3/31	Open lab[3]	Project work; share interim results		
13	4/7	Wellness Day	No class		
14	4/14	Open lab[3]	Project work; share interim results		
15	4/21	Open lab[3]	Project work; share interim results		
16	4/28	Open lab[3]	Prepare final report; complete course evaluations	Final report	(5/5)

[1] Deliverables are due electronically by midnight on the due date shown in parentheses. To avoid penalty, contact the instructor if there is any doubt about when deliverables are due, or if you think you cannot submit them on time.

[2] Some days are religious holidays. While classes will still meet, and deadlines will remain (these are not University holidays), the instructor will make every effort to accommodate students who observe these holidays with prior notice from student.

[3] During open lab, the instructor will be available by email (mhanson@usc.edu) and will respond to students within 24 hours.

Some essential GIS skills

Below is a list of some essential GIS skills we intend to cover in this course. Many of those listed are included in Gina Clemmer's book, *The GIS 20 Essential Skills,* published by ESRI Press. Others have emerged out of prior classes as skills potentially useful to aspiring planners and policy analysts.

1. Creating a folder connection
2. Creating a geodatabase
3. Working withTIGER/Line data
4. Querying data by attribute
5. Adding data to a geodatabase
6. Transferring maps and data between machines
7. Clipping data to a study area
8. Downloading attribute data from Census
9. Preparing attribute data using Excel
10. Joining attribute data to maps
11. Creating choropleth maps
12. Adding map elements
13. Connecting to Web Map Services in ArcGIS
14. Adding XY event data to maps
15. Creating buffer areas
16. Querying by location
17. Areal interpolation
18. Geocoding addresses
19. On-screen digitizing
20. Creating map books in Adobe X
21. Using smart phones as field collection tools
22. Configuring ESRI storymap templates

About the Instructor

Mark Hanson is an adjunct Associate Professor at USC's Price School of Public Policy and a Senior Quantitative Analyst at the RAND Corporation. He has also worked as urban and environmental planner, remote sensing consultant, research programmer, high school science teacher, and Peace Corps Volunteer.

For 20 years, Dr. Hanson has contributed to a diverse array of projects across all of RAND's domestic policy research units for a wide variety of public and private sector clients. Most recently, he led efforts to develop methods for estimating costs to rebuild the electrical power grid in Puerto Rico following Hurricanes Maria and Irma, and to improve the Federal Emergency Management Agency's public assistance grant process. Previously, he developed exploratory and decision tools for health plans to analyze member data to improve healthcare quality, and led programming efforts to develop simulation models for estimating the clinical and cost effectiveness of treatment options. He has also contributed to studies on transportation, habitat conservation planning, residential energy efficiency, and rebuilding communities after natural disaster. These studies have employed a variety of data and methods, including geostatistical data and methods, and are compiled in more than 75 technical reports, journal articles, and manuals.

For nearly 10 years, Dr. Hanson has taught courses in spatial analysis and statistics to graduate students at USC's Price School of Public Policy, where he earned his Ph.D. as Provost's Fellow (the University's highest award for doctoral students.) His dissertation research explored sustainable development trajectories and political organization of U.S. cities. He also holds M.P.A. and M.S. degrees from Indiana University's School of Public and Environmental Affairs where he studied wetland biology, water resource policy, deforestation processes, and developed expertise in field methods and satellite remote sensing to assess global change. He also holds a B.S. in Psychobiology and Business Administration from UCLA, a secondary teaching credential in Chemistry, and professional certifications in hazardous waste operations and construction cost estimation.