Department of Planning, Policy and Design
School of Social Ecology
University of California, Irvine
Winter 2013

PPD 235: Geographic Information Systems (GIS) and Planning

Meetings: Monday, 9:00 am – 11:50 pm

Room: Social & Behavioral Sciences Gateway (SBSG), Room 240 (lab on ground floor)

Course website: https://eee.uci.edu/12w/54550

Instructor: Doug Houston Office: Social Ecology I, 226D

Telephone: 949-824-1870 E-mail: houston@uci.edu

Office Hours: Tuesday, 1 pm – 2 pm, or by appointment

Description

The nature of urban planning issues and practices are predominantly spatial. Geographic information systems (GIS) are configurations of computer hardware and software specifically designed for the acquisition, storage, retrieval, maintenance, analysis, synthesis, and presentation of cartographic data in digital form. GIS enables planners to gather, store, manipulate, and analyze spatial data. GIS knowledge and skills have become an indispensable part of numerous planning jobs in both public and private sectors.

This course introduces the fundamental conventions and capabilities of GIS from a broad and practical perspective, with a focus on applications in the field of urban and regional planning. It does so by offering hands-on training in the use of ArcGIS 10 GIS software then relating these skills to the more general context of theoretical concepts and current professional practice. This course introduces students to the broad theoretical and conceptual background of GIS; explores planning-related GIS data, applications, analytical tools, and issues; and gives students basic, hands-on experience using GIS software.

At the end of the course, the students are expected to have:

1. Knowledge of how GIS is being used in planning and issues of GIS implementation in public planning agencies
2. Ability to access and explain the nature, characteristics, and possible ways of analyzing spatial data relevant to planning
3. Communicating findings via mapping and visualization

Format and Course Requirements

The course is organized as a series of weekly lectures and computer lab assignments. Lectures proceed from core principles of GIS-based software and mapping to increasingly sophisticated and applied techniques for spatial analysis. Students will learn the basics of the ArcGIS 10 software by completing the tutorial exercises in the book *GIS Tutorial 2: Spatial Analysis Workbook*, available

at the campus bookstore. Lab exercises will reinforce the concepts and techniques highlighted in lecture and tutorials and will require students to enhance and their skills by applying techniques to original data provided by the instructor.

There are four parts of the course: (1) attendance and class participation, (2) lab exercises, (3) GIS tutorials, and (4) a final project and report. These four parts are intended to reinforce, but not duplicate, one another. The course website will be the master source of information on course requirements and assignments, and students should check it regularly for updated materials and revisions to course schedule or readings. Changes will also be discussed in class to provide students sufficient advance notice of changes.

Grading: Final grades will be determined as follows:

Attendance and Class Participation	15 percent
Lab Exercises	15 percent
GIS Tutorial (5pts/week)	25 percent
Final Research Project (individual)	
Project Proposal	5 percent
Project Presentation	5 percent
Project Report	35 percent
Total	100 percent

Attendance and Class Participation: A major requirement of the course is regular attendance and active, informed participation and interaction with the instructor and other students in the class. Students can participate in several ways to participant:

a. *Attendance and Class Discussion*: Attendance will be recorded during class sessions, and students should actively participate in class discussion.
b. *Office Hours*: Students can receive credit towards participation by discussing substantive course content with the instructor before or after class or in office hours.
c. *Readings:* Weekly readings will be posted to the course website. Although students will not be tested on the content of readings, completing the readings are essential to understanding the core concepts and procedures covered in the class. Students should complete the readings prior to the corresponding class session, and be prepared to ask questions and discuss the content during the instructor's presentations, which will occur in the first half of most class sessions.

Lab Exercises: Students will receive credit for completing in-class lab exercises which require students to apply procedures and concepts from class presentations and tutorials. Lab exercises, when offered, which will occur in the second half of class sessions. To receive credit, students must turn in documentation of completed lab exercises (per the format instructions to be provided in class) using the dropbox on the class website by the date/time listed on the course schedule below.

GIS Tutorials: During the first half of the quarter, students are required to complete tutorial exercises in the following book available at the UCI student bookstore: David Allen (2011), *GIS Tutorial 2: Spatial Analysis Workbook*, Redlands, CA: ESRI Press. To receive credit, students must turn in a documentation of completed lab exercises (per the format instructions to be provided in class) using the dropbox on the class website by the date/time listed on the course schedule below.

Final Project: Students are required to complete a substantial GIS-based research project which explores spatial patterns relating to a topic the student selects. Students will propose a topic of focus and will work with the instructor to assess project feasibility, identify potential data sources, narrow and scale the research question, and design a research strategy to investigate the research question. Additional guidance on selecting and defining a topic will be provided in class. The schedule for the final is as follows:

a. *Project Proposal*: The proposed project must have a strong spatial component and be focused around one or two key research questions or hypotheses. The 1-page project proposal will be submitted early in the quarter and should (1) describe the policy/planning question to be explored, (2) why spatial aspects of the topic are important for exploration and analysis, (3) the geographic area of focus and scale, and (4) potential data sources to be explored. Proposals will be a starting point for a discussion with the instructor, who will help develop your research topic during the quarter.
b. *Project Presentation*: Students are required to make a five minute PowerPoint presentation of the major themes and findings of their project in class during the last week of the course. These presentations will encourage students to be proactive and start their research early in the quarter and will allow them to receive constructive feedback on their work which they should use to improve their final project report due in week 11 of the course.
c. *Final Project Report*: The final hardcopy report should present the final results of the student's project and be professionally written. It should clearly state project objectives, research methods and document results through clear maps and tabular results.

Late Assignments and Absences: For all written materials, late submissions will be penalized by 1/3 grade (e.g., from A- to B+) without a written proof of emergency. The late penalty for assignments can be waived only with a written note from a clinical professional (such as a doctor) indicating that the student was unable to complete class assignments during the assignment period or written documentation of an absence or late assignment due to a conflicting academic meeting/event. Students will not be penalized if an absence is excused for these reasons, but will be required to make up any missed class assignments in a reasonable timeframe approved by the instructor.

Academic Honesty and Plagiarism: Academic dishonestly will not be tolerated and could result in course failure and/or having the incident permanently noted in your student records. By turning in assignments, you are certifying that the work is your own and does not plagiarize or otherwise use other works without citing the appropriate reference. If you are unsure what constitutes academic dishonestly or plagiarism, it is your responsibility to make sure you understand the issues before you turn in written work. Here are some examples of plagiarism that you should carefully observe:

(a) When using someone else's sentence, you must enclose it in quote marks and identify the source;
(b) If you paraphrase someone else, you must acknowledge the author;
(c) If you insert in your paper a picture or a table from a web page or from a book, you need to reference your source.

If you have any questions about academic honesty or plagiarism regulations, please contact the instructor. For more information, see the UCI Academic Senate Policy on Academic Honesty (http://www.senate.uci.edu/senateweb/default2.asp?active_page_id=754).

Course Schedule

Date	Assignment	Details*
Week 1 (1/7)	Tutorial Chapters 1, 2	*Due*: Friday, 11pm
Week 2 (1/14)	Lab Exercise Tutorial Chapters 3, 4	*Due*: Tuesday, 11pm *Due*: Friday, 11pm
Week 3 (1/23) Wednesday (To be confirmed)	*Final Project:* Project Proposal (1-page) Lab Exercise Tutorial Chapters 5	*Due*: in class (***hardcopy***) *Due*: Tuesday, 11pm *Due*: Friday, 11pm
Week 4 (1/28)	Lab Exercise Tutorial Chapters 6, 7	*Due*: Tuesday, 5pm *Due*: Friday, 11pm
Week 5 (2/4)	Lab Exercise Tutorial Chapter 8, 9	*Due*: Tuesday, 11pm *Due*: Friday, 11pm
Week 6 (2/11)	Lab Exercise	*Due*: Friday, 11pm
Week 7 (2/20) Wednesday (To be confirmed)	Lab Exercise *Final Project:* Working Lab Session	*Due*: Tuesday, 11pm
Week 8 (2/25)	Lab Exercise *Final Project:* Working Lab Session	*Due*: Tuesday, 11pm
Week 9 (3/4)	*Final Project:* Working Lab Session	
Week 10 (3/11)	*Due*: Project Presentations	
Week 11	Final Project Report (hard copy)	*Due*: Tuesday, 5pm (***hardcopy***)

* All assignments are due electronically in the dropbox on the class webpage unless indicated otherwise.

Weekly Topics and Readings

Week 1 – Course Introduction and Overview

Topics: Overview of course, basics GIS concepts, mapping basics for planners, geographic data models, scale, generalization, projections and coordinate systems, overview of basic GIS functionality

Lab Exercise: Mapping Land Use

Readings

Chapter 1, "Basics of Mapping and GIS," pages 3-19, in Maantay and Ziegler (2006), GIS for the Urban Environment, Redlands, CA: ESRI Press.

Chapter 2, "Spatial Data and Basic Mapping Concepts," pages 25-53, in Maantay and Ziegler (2006), GIS for the Urban Environment, Redlands, CA: ESRI Press.

Tutorial

Chapter 1, "Mapping where things are," pages 1-28, in D. Allen (2011), GIS Tutorial 2: Spatial Analysis Workbook, Redlands, CA: ESRI Press.

Chapter 2, "Mapping the most and least," pages 29-74, in D. Allen (2011), GIS Tutorial 2: Spatial Analysis Workbook, Redlands, CA: ESRI Press.

Week 2 – Fundamentals of Mapping Patterns

Topics: Thematic mapping, types of maps and their components, mapping qualitative and quantitative information, methods of classification

Lab Exercise: Mapping Census Data

Readings

Chapter 3, "Thematic Mapping," pages 57-86, in Maantay and Ziegler (2006), GIS for the Urban Environment, Redlands, CA: ESRI Press.

Chapter 4, "Data Classification Methods and Data Exploration," pages 93-122, in Maantay and Ziegler (2006), GIS for the Urban Environment, Redlands, CA: ESRI Press.

Tutorial

Chapter 3, "Mapping density," pages 75-100, in D. Allen (2011), GIS Tutorial 2: Spatial Analysis Workbook, Redlands, CA: ESRI Press.

Chapter 4, "Finding what's inside," pages 101-122, in D. Allen (2011), GIS Tutorial 2: Spatial Analysis Workbook, Redlands, CA: ESRI Press.

Week 3 – Critical Perspectives on GIS

Topics: Critical perspectives on GIS, ethnical issues, spatial data sources, data quality and accuracy, geocoding

Guest Lecture: Raul Lejano, Professor, UCI Department of Planning, Policy and Design
"A Critical Appraisal of GIS in the Planning Domain"

Readings

Lejano, R. P. (2008) "Technology and Institutions: A Critical Appraisal of GIS in the Planning Domain," *Science Technology & Human Values*, 33:653

Tutorial

Chapter 5, "Finding what's nearby," pages 123-196, in D. Allen (2011), GIS Tutorial 2: Spatial Analysis Workbook, Redlands, CA: ESRI Press.

Week 4 – Geoprocessing, Proximity Analysis, Data Sources

Topics: Geoprocessing, cluster analysis, raster-based analysis

Lab Exercise: Geoprocessing Tools, Buffers, Proximity Analysis, Data Sources

Readings

Chapter 9, "Methods of Spatial Data Analysis," pages 209-239, in Maantay and Ziegler (2006), GIS for the Urban Environment, Redlands, CA: ESRI Press.

Chakraborty, J. A. Maantay, and J. D. Brender (2011) Disproportionate Proximity to Environmental Health Hazards: Methods, Models, and Measurement, American Journal of Public Health, 101(S1): S27-S36.

Tutorial

Chapter 6, "Mapping change," pages 197-222, in D. Allen (2011), GIS Tutorial 2: Spatial Analysis Workbook, Redlands, CA: ESRI Press.

Chapter 7, "Measuring geographic distribution," pages 223-254, in D. Allen (2011), GIS Tutorial 2: Spatial Analysis Workbook, Redlands, CA: ESRI Press.

Week 5 – Principles of Map Design

Topics: Fundamentals of map design and layout, data visualization, buffer analysis

Lab Exercise: Map Design

Readings

Chapter 5, "Data Visualization and Map Design," pages 125-153, in Maantay and Ziegler (2006), GIS for the Urban Environment, Redlands, CA: ESRI Press.

Buckley, A and K. Field (2011). Making a Meaningful Map, A checklist for compiling more effective maps, *ArcUser* (Fall 2011), pages 41-43.

Tutorial

Chapter 8, "Analyzing patterns," pages 255-290, in D. Allen (2011), GIS Tutorial 2: Spatial Analysis Workbook, Redlands, CA: ESRI Press.

Chapter 9, "Identifying clusters," pages 291-306, in D. Allen (2011), GIS Tutorial 2: Spatial Analysis Workbook, Redlands, CA: ESRI Press.

Week 6 – The Future of GIS, Data Accuracy

Readings

Drummond, W. J. & S. P. French (2008). The Future of GIS in Planning: Converging Technologies and Diverging Interests, *Journal of the American Planning Association*, 74:2, 161-174

Ong, P., Graham, M., Houston, D. (2006). "The Policy and Programmatic Importance of Spatial Alignment of Multiple GIS Data Sources," *American Journal of Public Health, 96(3)*, 499-504.

Zandbergen, P.A. (2007) "Influence of geocoding quality on environmental exposure assessment of children living near high traffic roads," *BMC Public Health*, 7:37

Week 7 – Advanced Spatial Analysis Tools

Lab Exercise: Spatial Analyst and Network Analyst

Week 8 – Applied Case Studies and Final Project Lab Session

Week 9 – Final Project Presentations, Part 1

Week 10 – Final Project Presentations, Part 2

Applied GIS Case Studies to Presented in Class *(and associated readings)*

Case Study: Health and Environmental Justice (Bronx, NY)

Maantay, J. (2007) "Asthma and air pollution in the Bronx: Methodological and data considerations in using GIS for environmental justice and health research," *Health & Place*, 13 32–56.

Case Study: Traffic Impacts in Southern California

Houston, D., Krudysz, M., Winer, A. (2008). Diesel Truck Traffic in Port-Adjacent Low-Income and Minority Communities; Environmental Justice Implications of Near-

Roadway Land Use Conflicts. *Transportation Research Record: Journal of the Transportation Research Board, 2076*, 38-46.

Case Study: Truck Impacts in the Harbor Communities

Houston, D., Wu, J., Ong, P., Winer, A. (2004). Structural Disparities of Urban Traffic in Southern California: Implications for Vehicle-Related Air Pollution Exposure in Minority and High-Poverty Neighborhoods. *Journal of Urban Affairs, 25(5)*, 565-592.

Case Study: Boyle Heights Activity and Exposure Study (BHAES)

Case Study: GIS and Community Based Advocacy Planning (Boyle Heights, CA)