Geographic Information Systems

Columbia University GSAPP PLANA4577 & A4578
Wood Auditorium, 113 Avery | Tuesdays, 9 – 11AM

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Syllabus: Fall 2017

A map says to you, "Read me carefully, follow me closely, doubt me not."
It says, "I am the earth in the palm of your hand. Without me, you are alone and lost."[1]

Course Description

Overview

Geographic Information Systems (GIS) are tools for managing, describing, analyzing, and presenting information about relationships between what happens and where it happens. Through GIS, geographic features are tied to attribute data describing aspects of those features – some qualitative such as land use and some quantitative such as demographic information. For its analytical possibilities and because its techniques allow one to represent social and environmental data as a map, GIS has become an important tool across a variety of fields for studying urban and rural areas alike, including planning, architecture, engineering, public health, environmental science, epidemiology, and business. Further, GIS has become an important political instrument allowing communities and regions to (geo)graphically tell their stories.

The course will cover technical skills associated with and required in spatial analysis, conceptual issues in geographic thinking and research design, as well as practical examples and case studies of GIS as applied in urban contexts.

Roughly speaking, the course is organized in two parts. The first two-thirds of the course will focus on the basics by leading the students through skills-based GIS exercises alongside lectures and readings that discuss pertinent geographical concepts. The last third of the course will focus on the development of individual student projects requiring that each student find data and design methods of analysis based on the techniques and approached learned in the course.

Method of Instruction

Unless otherwise specified in the Course Schedule, the course will meet twice per week: once in lecture and once again in smaller lab sections during which students will have the opportunity to work through assignments with faculty guidance, review previous assignments, and discuss the various applications of concepts covered in readings and lecture.

The class is designed around project-based learning with practical examples. Course exercises describe practical, although usually hypothetical, scenarios with clear constraints and objectives. Through these exercises, students are expected to apply and adapt skills and techniques to a variety of urban questions and problems. As such, lab sections are divided by individual discipline.

Student Learning Objectives

The course seeks to provide students with a basic level of familiarity with several aspects of Geographic Information Systems and Geographic Information Science, such that the range of possibilities for GIS-based work is understood and an adequate foundation for critically and effectively engaging those possibilities is laid. Thus the objectives for the course are

[1] From Beryl Markham. West with the Night. New York: North Point Press, 1983.

- Providing an understanding of introductory-level skills necessary to work with GIS, predominantly using ESRI's ArcGIS software;
- Teaching spatial data visualization techniques along with introductory knowledge of effective cartography and additional software for the production of maps and other information graphics;
- Teaching skills needed to develop and execute a project requiring GIS as a data management, analysis, and visualization tool;
- Identifying, accessing, and evaluating publicly available data sets; and
- Providing an introductory understanding of the ethical questions surrounding data creation, analysis, and representation in urban contexts.

Standard Information

Class meets in Wood Auditorium on Tuesdays from 9 to 11AM. Barring any technical difficulties, class will begin promptly.

Students must be enrolled in one of the course's lab sections (A4578), which meet as follows.

- Section 001 (UP students): 200 North Fayerweather, Tuesdays from 7 to 9PM, with Jeremy White (jeremy.white@columbia.edu) and TA: Rebecca Noble (rn2417@columbia.edu)
- Section 002 (UP students): 200 North Fayerweather, Wednesdays from 6 to 8PM, with Kazuki Sakamoto (ks2944@columbia.edu) and TA: Patrick Li (pl2593@columbia.edu)
- Section 003 (UP students): 200 North Fayerweather, Thursdays from 6 to 8PM, with Clara Chung (wc2410@columbia.edu) and TA: Joan Zhang (jhz2112@columbia.edu)
- Section 004 (architecture and design students): 202 Fayerweather, Tuesdays from 6 to 8M, with Grga Basic (gb2559@columbia.edu) and TA: Tola Oniyangi (tola.oniyangi@columbia.edu)

Device Policy

For the respect of others, the classroom policy on devices and computers is as follows.

- In addition to the exercises during lab sessions, students may use the lab computers, laptops, tablets, etc. to access readings and notes.
- Students may use those devices for other reasons very minimally, so long as they do not become a distraction or an in-class habit.
- Non-class-related, on-screen content is not allowed. This means that, by way of example, the absolute only way to make Twitter usage okay by this policy is to be tweeting about class (with appropriate hashtags and mentions, of course).

Evaluation & Grading

Readings & Participation (10% of final grade)

There is a considerable amount of reading available on GIS-related topics. Especially at the introductory level, an understanding of the science, theory, and application of GIS is extremely important. Care has been taken to include necessary readings within this course with an understanding that the assignments themselves can overwhelm a student's schedule before the time necessary for readings is taken into account. Therefore, while the suggested reading list is sometimes lengthy, the required readings are minimal.

Students are expected to keep up with the syllabus schedule, completing readings prior to class and arriving prepared for discussion in lecture and with questions in lab. Notes will be kept regarding student involvement for each class session.

Given the material covered in the course, the lab-based method of instruction, and the skills-development value of collaborative troubleshooting, it is only appropriate to include digital platforms when evaluating "active participation." The class's Canvas discussion board (see below) will be used for augmenting in-class discussion. For the social-media-platform inclined, use the hashtag #gsappGIS for participation credit.

Lab Exercises (50% of final grade, total)

Because GIS is rooted in computer-based analysis, its adequate teaching and learning requires regularly completed exercises. Successful completion of the course requires that students stay with the schedule, completing exercises in a timely manner (even between deliverable deadlines), such that skills learned early can be built upon later. Lab sessions will often be used to begin exercises that students are expected to complete outside of class or to answer questions about lab work conducted individually.

There are a total of five exercises, each of which contains multiple parts. Each of the five exercises accounts for 10% of a student's final grade in the course.

Midterm Exam (10% of final grade)

The course includes a two-part midterm exam. Part 1 is an open-book, open-note, open-Internet, individual (not discussed with classmates) take-home exam covering critical concepts and definitions. Part 2 is a closed-book, closed-note, individual, in-class practicum applying those concepts with GIS software. Prior to the exam, class time is reserved for review and preparation.

Final Project (30% of final grade, total)

Students are expected to design, research, and complete a small final project on a topic of their choosing by the end of the semester. The project is required to answer and/or explore a specifically spatial research question using GIS. Students may choose to work individually or in small groups (no larger than three students per group).

A full assignment description—detailing expectations, guidelines, and considerations—will be distributed before the midterm. Briefly, students will be required to submit a topic proposal with data sources prior to executing the project (worth 10% of the final grade), and class time toward the end of the semester is reserved for individual work with faculty guidance and desk crits. Final deliverables include a written and graphical report (worth 15% of the final grade) along with a presentation (5% of the final grade). Final presentations will be given before a panel of invited guests.

Opportunities for Extra Credit

Several exercises will include questions that can be answered for extra credit. Additional extra credit assignments may be offered at instructors' discretion.

Attendance

Given the method of instruction in the course, students are expected to attend every class meeting. Attendance records will be maintained throughout the semester (via sign-in sheets). Students with excessive absences (greater than 1) without appropriate reason will see a reduction in their final grades.

Students who will miss class due to religious holidays or other appropriate reason should email LM, their lab instructor, and TA in the first week of classes with the dates (and reasons) of their foreseen absences and are encouraged to make arrangements with their peers for notes.

Submission

Each assignment will outline the specific requirements for it submission format, deadline, and deliverable expectations. Be advised that some assignments may require online submission, hard-copy submission, or both.

Save for extenuating circumstances for which extensions will be given only with prior approval and compelling reasons, absolutely no late assignments will be accepted without a late penalty. The late penalty is a reduction of 50% of the total points possible within the first 24 hours after the deadline and an additional 25% of the total possible points up to 48 hours after the deadline.

Back-up Policy

Students are responsible for consistently backing up their work throughout the semester. Extensions will not be granted for technical losses of work. (Given the availability of cloud storage and the need to regularly store one's work off GSAPP machines, this should never be a problem in the course.)

Grades

Students are often concerned with where the lines are drawn in determining final grades based on the percentages listed above. To avoid confusion or panic, here's how it will work: HP > 95% > P > 75% > LP > 60% > F.

Any students in danger of receiving a Low Pass after the midterm exam will be notified, and a meeting will be scheduled to discuss expectations for the latter half of the semester.

Expectation of Academic Honesty

As always and as with every other course, this class is conducted in accordance with University policy on matters of academic honesty and integrity and with attention to the University's Honor Code. Note that instances of plagiarism will not be tolerated—whether in written text, in research design, or in data acquisition and creation—and will result in an automatic failure in the course. We build on the work of others; give credit where credit is due.

Additionally, this course contains a few considerations which should be stated. At several points in the semester, students will be encouraged to look to their peers for collaborative problem solving and troubleshooting especially within the lab setting. Except where otherwise stated in specific assignments, collaboration is welcomed but individual assignments must be conceived and completed individually.

Students with Disabilities

Students with disabilities taking this course who may need disability-related accommodations are encouraged to make an appointment with LM and their lab instructor as soon as possible. Disabled students who need accommodations should be registered in advance with the Office of Disability Services.

Resources & Materials

The X:\ Drive

All lab materials will be located on GSAPP's X:\ drive, which also contains the GIS data resources available for student use at GSAPP. These materials are organized by lab section and can be found at X:\GIS_Classes\A4577_Fall2017.

Software & Hardware

The course will focus heavily on techniques that use ESRI's ArcGIS suite of software. ArcGIS 10.4 is installed on GSAPP computers. Additionally, single-use educational licenses will be given to students in the class for use on their personal machines (Windows OS only). To request a license, notify your TA during the first week of class.

A note on GIS software: The course's objective is not to create experts in using ESRI software, and there are certainly a variety of other GIS software packages available. As an industry standard, we will use the ArcGIS desktop suite. That said, the skills are transferable to other software.

Recommended Purchases

There are no required reading purchases associated with the course. All reading materials not accessible online or via the University Libraries will be made available as PDFs and distributed through Canvas.

Students are encouraged to have an external hard drive with a minimum capacity of 20GB available or comparable accessible cloud storage for their files related to this class.

Canvas

This class will rely heavily on the Canvas platform for distributing readings, collecting and sharing additional resources, submitting digital copies of assignment deliverables, and discussion. Canvas will also be used to distribute class-wide emails. Please be sure to actively monitor the email address associated with your Canvas login.

If you have a question, it is likely that your peers may be presently working out the same issue or may have already found a solution. Students are encouraged to post questions and relevant points for conversation to the discussion board on Canvas and collectively work toward finding answers prior to emailing LM, your lab instructor, or TA. Learning GIS is a techniques-heavy endeavor with several moments that require developing critical problem-solving skills. These skills are substantially and demonstrably better acquired when the solutions are derived through work than through asking your TA.

As an incentive toward using the discussion board, every TA will participate in the online discussion (where necessary) on a (minimum) weekly basis.

ESRI ArcGIS Resource Center

The ESRI ArcGIS Resource Center is an excellent resource for technical GIS software questions. There you will find extensive "help" documentation on processes and tools within ArcGIS 10.1 as well as a blog, forum, and videos. It is very highly recommended that you search this site when you have a question. (If for no other reason, than to familiarize yourself with its offerings and limitations. When you leave this introductory course, it's almost certain that this will be one of your go-to resources for GIS-related help.)
http://resources.arcgis.com/en/help/main/10.1/

DSSC

The Digital Service Science Center is located on the lower level of Lehman Library (at SIPA) and is a great resource for GIS data and technical questions. DSSC collects spatial data and may have what you need for your final project. Further, if they don't have the data you're looking for, the data librarians can usually help you find it. DSSC also has technical consultants available for questions regarding data as well as those related to performing certain GIS operations. Their facility is equipped with computer stations (with extremely nice monitors). Check their hours of operation before visiting on the Columbia Libraries website.
http://library.columbia.edu/content/libraryweb/indiv/dssc.html

Other Online Resources

Students are also encouraged to use the University's subscription to the Lynda platform containing several video tutorials on various software packages (from Excel to GIS to Illustrator).

There are, of course, several other tutorials available online. Please use these sparingly and discriminatingly. They are usually fine for refreshing one's memory on "what to click," but can often foster bad habits.

Additional Skills Workshops

At different points in the semester, the TAs will offer additional software skills workshops for design software. These will be scheduled for times outside of class and will cover skills necessary for cartographic design and layout.

Office Hours

LM holds regular office hours in 303 Buell Hall on Tuesdays from noon to 1PM and by appointment. Following midterm, additional office hours will be scheduled to discuss course progress and final project development.

Lab Instructor lab/office hours will be held as follows.

- Grga Basic: Thursdays 10AM – noon in 654 Schermerhorn Hall Extension & by appointment.
- Clara Chung: Thursdays 8 – 9PM in 200 Fayerweather North & by appointment.
- Kaz Sakamoto: Wednesdays 8 – 9PM in 200 Fayerweather North & by appointment.
- Jeremy White: TBA & by appointment.

TA lab hours will be held as follows.

- Patrick Li: Thursdays 12 – 2PM in 200 Fayerweather North
- Tola Oniyangi: Tuesdays 2-3:30PM in M.Arch first-year studio (exact location TBA)
- Rebecca Noble: Fridays 11AM – 1PM in 200 Fayerweather North
- Joan Zhang: Wednesdays 1 – 3PM in 200 Fayerweather North

It is suggested that students use these lab hours as working session to take advantage of the available guidance. Of course, individual meetings can be arranged via email for times outside office hours by appointment.

Notes on Email

Do not expect immediate responses from LM, the lab instructors, or TAs to emailed questions. It is very important (especially during "crunch times") that you use the other resources available to you. There are several ways to find help if you need it, so please do not let an unanswered email hold you back. One of the greatest assets you will have in this course is your own time management. Use lab time and office hours wisely.

If you email a technical question, be sure to include enough information to receive an adequate and helpful response. Necessary information includes, but is not limited to,

(1) a complete description of what you are trying to accomplish and the problem you are encountering,
(2) any relevant information regarding the datasets you are using,
(3) the steps you have already taken to address your problem (so we don't tell you to do what you've already done), and
(4) any necessary screenshots to help us understand what you are doing when we cannot sit with you in front of a computer.

Do not be surprised if an email without this information is returned to you asking for elaboration.

Course Schedule

Notes on the Reading

Required readings are marked with an asterisk (*). Students are strongly encouraged to consult the optional readings as well. At a minimum, skim their pages. Several are included because of their value as references whether for cartographic examples, case studies that apply specific techniques in urban research, or technical definitions (especially those that are excerpted from textbooks).

Bibliographic Abbreviations

A few edited volumes and text books reappear throughout the semester's schedule. For convenience, their citations are abbreviated within the reading list. Their full citations are below.

LGMR
Longley, P A, Goodchild, M F, Maguire D J, and Rhind D W (eds). 2005. *Geographical Information Systems: Principles, Techniques, Management, and Applications (2nd Edition, Abridged Edition)*. Hoboken, NJ: John Wiley & Sons.

MZ
Maantay, Julie and John Ziegler. 2006. *GIS for the Urban Environment*. Redlands, CA: ESRI Press.

Part 1 | Mapping Data

Week 1
T 5 Sep

Introductions & Housekeeping
Premises: GIS, Spatial Analysis and Visualization, Tobler's First Law

ASSIGNMENTS:
Exercise 1 assignment is distributed at the start of lecture.
(Exercise assignments are distributed through Canvas. The accompanying data packages will be available on the X:\ drive for download.)

*Goodchild, Michael F *et al*. 2000. "Toward Spatially Integrated Social Science." In *International Regional Science Review*. 23(2): 139-159.
Johnston, R J. 2005. "Geography and GIS." In *LGMR,* 39-47.
Longley, Paul A, *et al*. 2005. "Chapter 1. Systems, Science, and Study." In *Geographical Information Systems and Science, 2nd Ed.*. Hoboken, NJ: John Wiley & Sons, 3-33.
**MZ.* "Chapter 1. Basics of Mapping and GIS." 5-23.
Yeh, Anthony G.O. 2005. "Urban Planning and GIS." In *LGMR*, 877-888.

Week 2
T 12 Sep

Spatial Data Structure, Types, & Classification;
Cartography & Symbology

*Kent, Robert B and Richard E Klosterman. 2000. "GIS and Mapping: Pitfalls for Planners." In *Journal of the American Planning Association.* 66(2): 189-198.
Kraak, M J. 2005. "Visualising Spatial Distributions." In *LGMR*, 157-173.
**MZ.* "Chapter 2: Spatial Data and Basic Mapping Concepts." 25-38.

-----. “Chapter 3: Thematic Mapping.” 57-89.
-----. “Chapter 4: Data Classification Methods and Data Exploration” [excerpts]. 94-115.
*Pickles, John. 2005. “Arguments, Debates, and Dialogues: the GIS-Social Theory Debate and the Concern for Alternatives.” In *LGMR*, 49-60.
Weibel, R and G Dutton. 2005. “Generalising Spatial Data and Dealing with Multiple Representations.” In *LGMR*, 125-155.
US Census Bureau. 2008. “A Compass for Understanding and Using American Community Survey Data: What General Data Users Need to Know.” US Department of Commerce. Economics and Statistics Administration.

Part 2 | Analyzing Data

Week 3
T 19 Sep

Projections & Coordinate Systems

ASSIGNMENTS:
Exercise 1 is due online at 9AM, Tuesday 19 Sep.
Exercise 2 assignment is distributed.

*Chang, Kang-Tsung. 2010. “Chapter 2. Coordinate Systems.” In *Introduction to Geographic Information Systems. 5th Edition.* Dubuque, IA: McGraw-Hill, 18-40.
*Monmonier, Mark. 1991. “Chapter 1: The Peters Projection Controversy.” In Drawing the Line. Chicago: University of Chicago Press, 9-44.
*Redford, Paul and Aaron Sorkin. 2001. “Somebody’s Going to Emergency, Somebody’s Going to Jail.” Season 2, Episode 16 of *The West Wing.* [Directed by Jessica Yu.] Excerpt at https://youtu.be/vVX-PrBRtTY.

Week 4
T 26 Sep

The Modifiable Areal Unit Problem;
Geoprocessing & Vector-based Analysis

Mark, D M. 2005. “Spatial Representation: A Cognitive View.” In *LGMR*, 81-89.
Martin, D G. 2005. “Spatial Representation: The Social Scientist’s Perspective.” In *LGMR*, 71-80.
*Miller, Harvey J. 2004. “Tobler’s First Law and Spatial Analysis.” In *Annals of the Association of American Geographers.* 94(2): 284-289.
Monmonier, Mark. 1991. “Chapter 10. Data Maps: Making Nonsense of the Census.” In *How to Lie with Maps.* Chicago: University of Chicago Press, 139-162.
**MZ.* “Chapter 9. Methods of Spatial Data Analysis.” 209-235.
Raper, J F. 2005. “Spatial Representation: The Scientist’s Perspective.” In *LGMR*, 61-70.
*Schlossberg, Marc. 2003. “GIS, the US Census, and Neighborhood Scale Analysis.” In *Planning, Practice, and Research*. 18(2-3): 213-217.

Week 5
T 3 Oct

Raster-based Analysis: Raster Math, Density Mapping
An Introduction to Interpolation & Remote Sensing

ASSIGNMENTS:
Exercise 2 is due online at 9AM on Tuesday, 3 Oct.
Exercise 3 assignment is distributed.

*Cote, Paul. N.d. “Common Patterns in Raster Modeling.” <http://www.pbcgis.com/raster/>
*Couclelis, Helen. 1992. “People Manipulate Objects (but Cultivate Fields): Beyond the Raster-Vector Debate in GIS.” In Frank, *et. al*. (Eds.) *Theories and Methods of Spatio-Temporal Reasoning in Geographic Space.* Springer Berlin Heidelberg, 65-77.
*McHarg, Ian. 1969. New York: *Design with Nature.* American Museum of Natural History, selected excerpts.
MZ. “Chapter 12. Other Geotechnologies and Recent Developments in GIS.” 293-314.
Ratti, Carlo and Paul Richens. 2004. “Raster Analysis of Urban Form.” In *Environment and Planning B.* 31(2): 297-309.

Week 6
T 10 Oct

Multi-Criteria Evaluation & Spatial Decision Support Systems

Applied Geographics Inc and Philip B Herr & Associates. 2002. "Amherst Build-out Analysis and Future Growth Study."

*Carr, Margaret H and Paul D Zwick. 2007. *Smart Land-Use Analysis: The LUCIS Model.* Redlands, CA: ESRI Press. [NOTE: Focus on Chapters 8 through 12. Skim Chapters 4 through 7 for reference.]

Eastman, J R. 2005. "Multi-Criteria Evaluation and GIS." In *LGMR,* 493-502.

Johnson, Michael P. 2005. "Spatial Decision Support for Assisted Housing Mobility Counseling." In *Decision Support Systems.* 41: 296-312.

*Malczewski, Jacek. 2004. "GIS-based Land-use Suitability Analysis: A Critical Overview." In *Progress in Planning* 62(1): 3-65. [NOTE: The entire paper is provided with the readings. Only Sections 3.3, 3.4, 4.1, 4.2, and 4.4 are required. Note Chapter 5 for research examples. Skim the others as a refresher.]

-----. 2006. "GIS-based Multicriteria Decision Analysis: A Survey of the Literature." In *International Journal of Geographic Information Science.* 20(7): 703-726.

Week 7
T 17 Oct

Introduction to Spatial Statistics & Clustering

ASSIGNMENTS:
Exercise 3 is due online at 9AM Tuesday, 17 Oct.
Final Project assignment description and Exercise 4 are distributed.

Anselin, Luc. 2005. "Interactive Techniques and Exploratory Spatial Data Analysis." In *LGMR,* 253-266.

-----. 2005. "Chapter 5. Spatial Statistical Modeling in a GIS Environment." In Maguire, D J, *et al* (eds.) *GIS, Spatial Analysis, and Modeling.* Redlands, CA: ESRI Press, 93-111.

Getis, A. 2005. "Spatial Statistics." In *LGMR*, 239-251.

*Ogneva-Hillelberger, Yelena and Brian Cooperman. 2010. "Spatio-Temporal Analysis of Noise Pollution near Boston Logan Airport: Who Carries the Cost?" in *Urban Studies*. 47(1): 169-182.

McGrew, J Chapman and Charles B Monroe. 2000. "Chapter 12. Inferential Spatial Statistics." In *An Introduction to Statistical Problem Solving in Geography, 2nd Edition.* Long Grove, IL: Waveland Press, 171-190.

*Mitchell, Andy. 2005. *The Esri Guide to GIS Analysis. Volume 2: Spatial Measurements and Statistics.* Redlands, CA: ESRI Press, 63-181. [NOTE: Skim for key concepts, and definitions; Keep for reference.]

*Paez, Antonio and Darren M Scott. 2004. "Spatial Statistics for Urban Analysis: A Review of Techniques with Examples." In *GeoJournal*. 61(1): 53-67. [NOTE: For the less statistically inclined, feel free to skim the explicitly mathematical in this paper. It is the critical and conceptual discussion that is important here.]

Week 8
T 24 Oct
Midterm Exam

The midterm exam will cover material covered in lectures through Week 6 (*Spatial Decision Support Systems*) and material covered in lab through the Exercise 2 assignment. Students are expected to arrive in lecture class on Tuesday having reviewed this content and prepared with study questions. LM will spend this class time answering any questions students raise. At the end of the class session, the take-home component of the exam will be distributed.

Part 1 (the take-home component) of the midterm exam is due electronically by 9AM on Thursday, 26 October. Part 2 (the in-class skills practicum portion) of the midterm exam will be completed in lab sections.

Week 9
T 31 Oct

Introduction to Networks

Chang, Kang-Tsung. 2010. "Chapter 17. Least-Cost Path Analysis and Network Analysis." In *Introduction to Geographic Information Systems. 5th Edition.* Dubuque, IA: McGraw-Hill, 372-394. [NOTE: The primary focus should be on the latter half of the chapter

(Networks). Still, the first half provides a basis for raster-based approaches to similar questions and analyses.]

Nyerges, Timothy L. 2004. "Chapter 7. GIS in Urban-Regional Transportation Planning." In Hanson, S and G Giuliano (eds). *The Geography of Urban Transportation, 3rd Edition.* New York: The Guilford Press, 163-195.

*Oliver, Lisa N, Nadine Schuurman, and Alexander W Hall. 2007 "Comparing Circular and Network Buffers to Examine the Influence of Land Use on Walking for Leisure and Errands." In *International Journal of Health Geographics.* 6(41)

Porta, Sergio, *et al.* 2006. "The Network Analysis of Urban Streets: A Dual Approach." In *Physica A: Statistical Mechanics and its Applications.* 369(2):853-866.

*Sultana, Selima and Joe Weber. 2007. "Journey-to-Work Patterns in the Age of Sprawl: Evidence from Two Midsize Southern Metropolitan Areas." In *The Professional Geographer.* 59(2): 193-208.

*Upchurch, Chris *et al.* 2004. "Using GIS to Generate Mutually Exclusive Service Areas Linking Travel On and Off a Network." In *Journal of Transport Geography.* 12: 23-33.

Part 3 | Making Data

Week 10
T 7 Nov

NO LECTURE: University Election Holiday

Lab Sections will be devoted to desk crit sessions for the development of Final Project topic proposals. Sections scheduled to meet on Tuesday will be rescheduled or additional office hours will be provided for student meetings to discuss topic proposals.

ASSIGNMENTS:
Exercise 4 is due online at 9AM Wednesday, 8 November.

Week 11
T 14 Nov

Data Collection, Creation, and Uncertainty

ASSIGNMENTS:
Final Project Topic Proposal is due online at 9AM, Tuesday 14 November.
Exercise 5 is distributed.

Horn, M. 2005. "GIS and the Geography of Politics." In *LGMR*, 939-951.

*Monmonier, Mark. 1995. "Chapter 6. Maps, Votes, and Power." In *Drawing the Line.* New York: Henry Holt and Company, 189-219.

**MZ.* "Chapter 7. Mapping Databases." 181-189.

Week 12
T 21 Nov

Participation, Privacy, Protection, and GIS

NO LABS: THANKSGIVING HOLIDAY

*Kingston, Richard. 2007. "Public Participation in Local Policy Decision-Making: The Role of Web-bsed Mapping." In *The Cartographic Journal.* 44(2) 138-144.

Shiffer, M J. 2005. "Managing Public Discourse: Towards the Augmentation of GIS with Multimedia." In *LGMR*, 723-732.

*Talen, Emily. 2000. "Bottom-Up GIS." In *Journal of the American Planning Association.* 66(3): 279-294.

*United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). 2011. *Promoting the Use of Statistical Data for Policy and Advocacy: Building on Success.* [NOTE: Read the case study on data and privacy (Vanuatu) beginning on page 158; keep the rest for reference.]

Part 4 | Conclusions & Implications

Week 13
T 28 Nov

Future Directions: Research, WebGIS, Geolocative Services, and Ubiquitous Computing; GIS Infrastructures, Implications, and Ethics

ASSIGNMENTS:
Exercise 5 is due online at 9AM, Tuesday, 28 November.

*Crampton, Jeremy. 1995. "The Ethics of GIS." In *Cartography and Geographic Information Systems.* 22(1): 84-89.
*Curry, Michael R. 1995. "Rethinking Rights and Responsibilities in Geographic Information Systems: Beyond the Power of the Image." In *Cartography and Geographic Information Systems.* 22(1): 58-69.
*Miller, Roger P. 1995. "Beyond Method, Beyond Ethics: Integrating Social Theory into GIS and GIS into Social Theory." In *Cartography and Geographic Information Systems.* 22(1): 98-103.
Onsrud, Harlan J. 1995. "Identifying Unethical Conduct in the Use of GIS." In *Cartography and Geographic Information Systems.* 22(1): 90-97
Skarlatidou, Artemis *et al.* 2011. "Trust In WebGIS: The Role of the Trustee Attributes in the Design of Trustworthy Web GIS Applications." In *International Journal of Geographical Information Science.* 25(12): 1913-1930.
Smith Patterson, J and K Siderelis. 2005. "Managing a Whole Economy: the Contribution of GIS." In *LGMR*, 733-743.

Week 14
T 5 Dec

FINAL PROJECT REVIEW
A final review will be scheduled for the last week of class. Final presentation ("flash talk") slides are due by 11:59PM on Sunday, 3 December. Final deliverables are due by 11:59PM on Monday, 11 December.

ASSIGNMENTS
Extra Credit Assignments are due by 9AM on Tuesday, 5 December.

Additional References

ACS Dataset References

US Census Bureau. 2009. "A Compass for Understanding and Using American Community Survey Data: What Researchers Need to Know." US Department of Commerce. Economics and Statistics Administration.
-----. 2009. "A Compass for Understanding and Using American Community Survey Data: What State and Local Governments Need to Know." US Department of Commerce. Economics and Statistics Administration.

Example Research on Planning Topics

Drewnowski, A, *et al.* 2014. "Food Environment and Socioeconomic Status Influence Obesity Rates in Seattle and in Paris." In *International Journal of Obesity.* 38(2): 306-314.
Erenstein, Olaf, Jon Hellin, Parvesh Chandna. 2010. "Poverty Mapping Based on Livelihood Assets: A Meso-level Application in the Indo-Gangetic Plains, India." In *Applied Geography.* 30(1): 112-125.
Jones, Ken and Tony Hernandez. 2004. "Chapter 2. Retail Applications of Spatial Modelling." In J. Stillwell and G Clarke (eds). *Applied GIS and Spatial Analysis.* New York: John Wiley & Sons, 11-33.
McEntee, Jesse and Julian Agyeman. 2010. "Towards the Development of a GIS Method for Identifying Rural Food Deserts: Geographic Access in Vermont, USA." In *Applied Geography.* 30(1): 165-176.
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