GEO 441: GIS for Community Development (Section 101)
Cross-listed with MPS 604 (Section 101) and MPH 595 (Section 101)
Autumn 2014 | Department of Geography | DePaul University

Time Mon 6-9:15 pm **Location**: SAC 224 (GIS Lab)

Instructor: Sungsoon (Julie) Hwang (office: 990 W Fullerton room #4513; email: shwang9@depaul.edu; phone: (773) 325-8669; homepage: gis.depaul.edu/shwang; office hours: Mon, Tue, Thurs 2-3 pm and by appointment)

Teaching Assistant: David Semitekol (email: davidsemitekol@gmail.com; lab hours: TBA)

Course Description: This course introduces GIS with focus on its applications to community studies and community development. GIS, computer-based systems for solving spatial problems, have been widely used in many applications including disaster response, public health, crime analysis, market analysis, archeology, environmental modeling, and much more. The course covers GIS fundamentals. Topics include the following five knowledge areas: geospatial coordinate systems (Datum, map projection), data capture (GPS, remote sensing, etc.), data models (vector, raster, relational database), map design, and spatial analysis. Course contents are aligned with Geospatial Technology Competency Model (GTCM). Class is accomplished through lectures and hands-on activities. The course will explain how GIS works; enable students to learn techniques including mapping, spatial analysis, and data management; and provide students with the opportunity to apply GIS to community development.

Course Topics: through this course you will learn
- What GIS is, and how GIS has been used particularly in community development
- How coordinate systems for GIS are defined, including datum and map projections (georeferencing)
- Where data for GIS come from (or are created), and where to get those data (data for GIS)
- How data for GIS is structured and organized in a computer (data model)
- How to design and make effective maps (cartography)
- How to conduct basic spatial analysis, including buffering, overlay, and query (spatial analysis)

Learning Outcomes: At the completion of each module of GEO 441, you should be able to
- Enumerate what specific functions can be performed with GIS in at least two application areas
- Explain patterns of distortion in different map projections with known parameters
- Use common geospatial coordinate systems appropriately, such as geographic (latitude and longitude), Universal Transverse Mercator and State Plane Coordinate System
- Collect earth coordinate data using a GPS receiver, and import GPS data into GIS
- Differentiate types of resolution that characterize remotely sensed imagery
- Assess strengths and weaknesses of data models representing geography
- Perform selection query and table join on attribute tables properly
- Articulate effects of data representation (e.g., data normalization/classification) on thematic maps
- Employ cartographic design principles to make maps suited to a given problem
- Identify suitable sites using buffer and overlay on vector data
- Assess site suitability using map algebra on raster data
- Use GIS appropriately to address an issue related to community development

Course Readings
- John Jensen & Ryan Jensen (2012) *Introductory Geographic Information Systems*, Pearson (ISBN: 978-0136147763)—required.
- Gary Paul Green & Anna Haines (2012) *Asset Building & Community Development*, Sage (ISBN: 978-1-4129-8223-8)—recommended. This is for Assignment #2. A copy of relevant chapters is available upon request.

Outlines of Topics & Tentative Schedules

Wk	Date	Topic	Read	In-class activities	Assignments due (Fri 9 pm)
1	9/15	Course overview Introduction to GIS	Ch1	1. Introduction to ArcGIS	
2	9/22	Datum & map projections Coordinate systems	Ch2	2. Understand map projections 3. Change coordinate systems	
3	9/29	**Quiz1**/GPS Remote sensing	Ch3	4. Collect data using GPS 5. Classify remotely sensed images	1. Point mapping
4	10/6	Spatial data model Relational database	Ch5	6. Explore geographic data 7. Work with attribute table	2. Data for community GIS
5	10/13	**Quiz2**/Map reading Map design	Ch10	8. Make thematic map I 9. Make thematic map II	3. Census mapping
6	10/20	Vector spatial analysis Help for proposal	Ch6	10. Vector suitability analysis	4. Toxic mapping
7	10/27	Raster spatial analysis Help for proposal	Ch6	11. Raster suitability analysis	**Proposal**
8	11/3	**Quiz3**			
9	11/10	Project			
10	11/17	**Project presentation**			**Map of the Month**

Grading Components

- 11Activities (each 2 points): 22 points
- 3 Quizzes (each 6 points): 18 points
- 4 Assignments (each 4 points): 16 points
- Project (proposal 4 pts.; presentation 4 pts.; report 20 pts.): 28 points
- Participation: 10 points
- Map of the Month 6 points

Activities: complete hands-on activities designed to help you make sense of concepts covered in readings and lectures and learn basic ArcGIS skills. Activities are done when instructors are present. Although reasonable amount of time will be given to complete activities in the class, it is expected that you will complete remaining part of activities outside of the class in case you can't complete activities in the class. If this happens to you, I recommend that

- Show up during **lab hours** which will be held in GIS lab, and complete work with a TA;
- Do it on your own in computer labs with ArcGIS—**SAC224**, **SAC268**, **Daley 1327**, **computer labs in Richardson Library, and Loop Library**. For open hours in GIS lab (SAC224) and SAC 268, check http://qrc.depaul.edu/hours.htm before visit since these locations are occupied by classes in many cases.
- Install a **60-day free trial of ArcGIS 10.2**, and work in your personal computer. You could also buy an ESRI Press book that comes with a 180-day evaluation copy or buy ArcGIS for Home Use for a $100 annual fee.

Quizzes: check your knowledge of GIS fundamentals. Quizzes will be held in week 3, 5, and 8. The quiz is non-cumulative, and covers materials from the previous units. For example, the first quiz covers contents of week 1 and 2, and second quiz covers week 3 and 4. The format of quizzes is fill the blank, true and false, multiple choice, and short essay. No ArcGIS skills are tested in quizzes.

Assignments: solidify GIS concepts and ArcGIS skills by applying them to a new problem set.

- #1 (point mapping): make a point map showing location of geographic features using XY data. This will assess whether you can choose appropriate geodetic datum and map projections for a given locality

- #2 (data for community GIS): assess data necessary for addressing a specific issue in community development of your interest. This will evaluate whether you can identify data appropriate for intended uses in a GIS project while keeping data limitations in mind
- #3 (census mapping): make a thematic map by joining an attribute table to census spatial data (TIGER/Line). This will test whether you comprehend key concepts of relational database, and put that comprehension into map-making
- #4 (toxic mapping): make a thematic map that visualizes amount of toxic chemicals released from the EPA's Toxic Release Inventory. This will check whether you can apply map design principles to map-making properly

Project: propose and conduct a GIS project that (a) demonstrates comprehensive use of GIS knowledge (that is, drawing on at least two knowledge areas from data collection, database, map-making, and spatial analysis); (b) uses empirical data; and (c) addresses an issue related to community development. Topics of GIS projects in the previous quarters include green roofs and energy usage, food desert, health impacts of hazardous waste sites, vacant spaces in Chicago, crop suitability in Africa, global disease and poverty, and quality of life in Canada Provinces.

Participation: assigned according to the criteria below
- A (9-10) = Student is present in all or nearly class meetings, and prepared, at all times, to respond to questions. Student is an active participant in and out of class, and stays on task in class-time activities.
- B (8-9) = Student participates as above, 75% of the time.
- C (6.5-8) = Student does not volunteer comments; responses demonstrate vague familiarity with course readings. Student is a passive participant in and out of class, and/or does not stay on task during class-time activities.
- D (5-6.5) = Student never volunteers, cannot respond to direct questions, keeps silent during class discussions and is unable to summarize readings if asked.
- F (0-5) = Student misses many class sessions and/or sits silently in classes when present, or is disruptive and non-participatory in the classroom.

Map of the Month: Once a month, the department of geography publishes maps done by students in various internal and external DePaul publications to reach out a wider audience on GIS and geography and to promote students' work. Submit a map revised from your project to Map of the Month along with an abstract that summarizes the map.

Grading Scale: A 93-100%; A- 90-92.99%; B+ 87-89.99%; B 83-86.99%: C+ 77-79.99%; C 73-76.99%; D+ 60-69.99%; D 50-59.99%; F 0-49.99%

Late Work Policy: Late work can be accepted with the reduction of 20% of the grade per day being late. For instance, if you turn in labs 5 days after due dates, no points will be granted.

Academic Honesty and Plagiarism: Academic honesty and integrity are expected at all times. Academic dishonesty, such as cheating or copying during exams, will be punished severely. Plagiarism – using someone else's work without acknowledgment and, therefore, presenting their ideas or quotations as your own work – is strictly forbidden. DePaul University officials will be informed of any instance of academic dishonesty and notification will be placed in your file. Please read the DePaul Academic Integrity Resources page (http://academicintegrity.depaul.edu/Resources/index.html) for definitions and explanations of plagiarism and the University's Academic Integrity expectations for students. Cutting and pasting text taken directly from a web-site without appropriate referencing and quotation marks is plagiarism and is forbidden. Submitting work that has any part cut and pasted directly from the internet is grounds for an automatic grade of zero.

Accommodations: Any student who requires assistance is asked to contact the University's Center for Students with Disabilities (CSD) (Phone 773/325-1677, TTY 773/325-7296, Fax 773/325-7396,http://studentaffairs.depaul.edu/studentswithdisabilities).They will be able to assist both student and faculty. If you have a condition that requires accommodation from the Productive Learning Strategies program (PLuS Program) please contact them at the Student Center room 370 (Phone 773/3251677 or online: http://studentaffairs.depaul.edu/plus/

University Center for Writing-Based Learning: Collaborates with writers from all disciplines, backgrounds, levels of expertise, and roles within the University community. Their goal is to help develop better writers along with better writing and reflection through continual revision. If you need assistance with writing assignments, they can be contacted at: 773.325.4272 (LPC) or wcenter@depaul.edu

Department of Geography Learning Goals

Courses in the Department of Geography teach students—GEO 441 addresses goals #1, 5, and 7:

1. Understand spatial patterns and processes of modification of the Earth's physical and cultural landscapes
   (a) As social constructions.
   (b) As systems that link the Earth with human society in interdependent, dialectical relationships, and
   (c) Through mapping and visualization.

2. Understand the concept of scale as a spatial phenomenon that ties the local, the regional, the national, the transnational, and the global in a system of interaction.

3. Understand the phenomenology of the discipline of Geography—most importantly, "space", "place", "landscape," "region," and "location".

4. Distinguish that spaces, places, and so on, may have both objective and subjective/symbolic dimensions.

5. Develop research and writing competences that would allow you to:
   (a) Formulate a cogent research question about the spatial character of a physical, socio-cultural, or environment-societal phenomenon,
   (b) Write about it in ways that reflect analytical and critical thinking, and
   (c) Ethical concern over social and environmental justice, consistent with the University's social mission.

6. Engage competently in qualitative and quantitative spatial analysis, and with exercises that are concerned with explaining spatial regularities (for example, the spatial calculus behind the location of retail commerce in Chicago, or transnational flows of capital).

7. Learn the basic utility and use competently one or more of the information technologies that are now redefining the logistical limits of spatial analysis: geographic information systems (GIS) and remote sensing.

8. Achieve greater general knowledge of the world, its regions, its physical systems, its cultures, and political-territorial divisions.