GEO 441: GIS for Community Development

Cross-listed with MPS 552 and MPH 595

Autumn Quarter 2018 | Department of Geography | DePaul University

We meet on Wednesday 6-9:15 PM in Schmitt Academic Center 224

1. Course Description: This course will focus on applications of Geographic Information Systems (GIS) to community studies and community development. GIS is rapidly entering the realm of community development. The course will enable students to perform common GIS techniques including data management, mapping, and spatial analysis geared toward community development. Topics include spatial data models, geodesy, databases, cartography, and spatial analysis. Course contents are aligned with Geospatial Technology Competency Model. The course is conducted through interactive lectures and hands-on activities using ArcGIS. Lab activities will be focused on learning basic skills for using ESRI ArcGIS Desktop. Students should propose a small GIS project for community development, and conduct the project both guided by instructors and independently. PREREQUISITE(S): Bachelor's Degree

2. Instructors' Contact and Office/Lab hours

	Instructor	Teaching Assistant	GIS Coordinator
Name	Sungsoon (Julie) Hwang	Nora Bryne	Cassie Follett
Contact	shwang9@depaul.edu (773) 325-8668	nbryne@gmail.com	CFOLLETT@depaul.edu (773) 325-3267
Where	990 W Fullerton, 3133	990 GIS Lab: 990 W Fullerton, 3135	990 W Fullerton, 3134
When	T/TH 2-3 pm or by appointment	Fri 3-5 pm	when technical issues arise in 990 GIS Lab

3. Course Topics: through this course you will learn

- What GIS is, and how GIS has been and can be used in community development
- How coordinate systems for GIS are defined (datums, map projections)
- How data for GIS is structured in a computer (spatial data models, relational databases)
- How to design and make effective maps (cartography)
- How to conduct basic spatial analysis such as buffer, overlay, query, and map algebra

4. Learning Outcomes: with the completion of each module of GEO 441, you should be able to

- Enumerate what you can do with GIS in various application areas
- Use common coordinate systems appropriately, including Geographic Coordinate System (GCS), Universal Transverse Mercator (UTM) and State Plane Coordinate System (SPC)
- Assess strengths and weaknesses of data models representing geography
- Perform SQL selection query and table join on attribute tables in GIS software
- Employ cartographic design principles to make maps suited to a given problem
- Assess site suitability based on multiple criteria using appropriate tools of spatial analysis
- Use GIS appropriately to address an issue related to community development

5. Course Readings

- Paul Bolstad (2016) *GIS Fundamentals: A First Text on Geographic Information System*, Fifth Edition, XanEdu Publishing Inc.—Click here to purchase a book or buy in a college bookstore at Lincoln Park Campus at 2425 N Sheffield Ave, Chicago IL 60614.
- Other supplemental readings will be provided on D2L.

6. Outlines of Topics and Schedules* (Important Due Dates)

Wk.	Date	Topic	Reading	In-class activities	Assignments
1	09.05	course overview, introduction to ArcGIS		Lab1. Introduction to ArcGIS Desktop	
2	09.12	**1. Introduction to GIS & spatial data models**	ch1,2	Lab2. get to know geospatial data	
3	09.19	**2. Geodesy**: datum, map projection, coordinate systems	ch3	Lab3. map XY data and project maps	
4	09.26	Quiz1, **3. Relational database**: query, table join	ch8	Lab4. work with attribute data	HW1 (9/28 Fri)
5	10.03	**4. Cartography**: map reading, map design	see D2L	Lab5. make thematic maps	HW2 (10/5 Fri)
6	10.10	Quiz2, **5. Spatial analysis**: buffer, overlay, map algebra	ch9,10	Lab6. conduct site suitability analysis	HW3 (10/12 Fri)
7	10.17	**6. GIS for community development**, proposal help	see D2L	one-on-one discussion on project	HW4 (10/19 Fri)
8	10.24	Quiz3, work on project			Proposal (10/23 Tue)
9	10.31	work on project			
10	11.07	Presentation			
11	11.14	Report due on D2L			

* Class schedules and topics are subject to change depending on how weekly classes progress

Time Requirements: Students should be prepared to spend roughly 4-6 hours each week outside normal class hours to read a text, complete lab activities and homework, and prepare for quizzes.

7. Grading Components

Components	*Effort types*	*Points*
Participation	Individual	10 points
6 lab activities (each 3 points)	Group	18 points
4 homework (each 4 pts)	Individual	16 points
3 quizzes (each 8 pts)	Individual	24 points
Project (proposal 5 pts, presentation 5 pts, report 22 pts)	Individual or group	32 points

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%

Participation: assigned according to the criteria below

- 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 small group activities, in and out of class, and in class-time activities stays on task.
- 8-9 = Student participates as above, 75% of the time.

- 6-7 = Student does not volunteer comments; responses demonstrate vague familiarity with course readings. Student is a passive member of small group activities and/or does not stay on task during class-time activities.
- 5-6 = Student never volunteers, cannot respond to direct questions, keeps silent during class discussions and is unable to summarize readings if asked.
- 0-5 = Student misses many class sessions and/or sits silently in classes when present, or is disruptive and non-participatory in the classroom.

Lab activities: the best way to learn GIS is by doing. Lab activities will teach you basic ArcGIS skills while helping you make sense of any new concepts you learned. There will be two or more questions to answer in each hands-on activity. Follow instructions carefully and understand what you're doing to answer those questions correctly. You can work on performing GIS tasks alone, but answers to questions should be submitted as a group of three assigned in the class. Exercises will be completed in class when instructors are present under most circumstances. Although reasonable amount of time is given to complete lab activities in the class, it is expected that you as a group will complete remaining part of activities outside of the class if you can't complete activities in the class while most of other groups completed activities in time. Lab activities are due in two days (by Friday night) after a lab is handed out in the class unless noted otherwise.

Homework: homework provides another opportunity for you to apply GIS skills to a new problem set independently. You need to complete relevant lab activities successfully before completing homework. Homework should be submitted individually.

- HW #1 (point mapping): make a point map by turning a delimited text file with XY coordinates into geospatial data. This assesses whether you can choose appropriate geodetic datum and map projections for a given geographic area of interest.
- HW #2 (data for community GIS): identify data you will need to acquire, to address a community development issue that interests you, and document characteristics of the data by exploring data in ArcGIS and/or reading metadata. This evaluates whether you can identify and assess data appropriate for a proposed GIS project.
- HW #3 (census mapping): make a thematic map by joining an attribute table to spatial data. This assesses whether you comprehend key concepts of relational databases such as data types, table join, and normal form.
- HW #4 (toxic mapping): make a thematic map that visualizes the amount of toxic chemicals released from the EPA's Toxic Release Inventory (TRI) facilities in your home county. This will check whether you can apply principles of cartographic design to map-making appropriately.

Quizzes: there will be three quizzes. Quiz1 scheduled on week 4 covers materials discussed during week 1, 2, and 3; Quiz2 on week 6 coves materials discussed during week 4, and 5; Quiz3 on week 8 covers materials discussed during week 6, and 7. Quizzes are designed to test your knowledge of GIS largely drawing from reading and lecture. No ArcGIS skills are tested in quizzes.

Project: propose and conduct a GIS project. Project can be proposed either individually or by group. The project should (1) apply GIS techniques drawn from at least two modules out of module 2, 3, 4, and 5; (2) use empirical data; and (3) address 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, utilization of vacant spaces in Chicago, crop suitability in Africa, global disease and poverty, and quality of life in Canada Provinces.

Late Work Policy: Late work will not be accepted. Extensions can be requested if needed, but will be only granted under understandable circumstances.

Makeup Exam/Incomplete Grade Policy: A makeup exam or an incomplete grade can be arranged or granted only when credible dire and documented medical or family situations arise and these circumstances are communicated in a timely fashion.

8. Learning Objectives by Module

Module 1. Introduction to GIS & spatial data models

- Compare and contrast GIS to other similar tools
- List commonly used functions in GIS along with relevant real-world applications
- Describe how vector and raster represent spatial features in GIS differently
- Explore characteristics of geospatial data in different formats through ArcGIS and metadata

Module 2. Geodesy

- Describe what datum is
- Describe what map projection is
- Describe Geographic Coordinate System (GCS)
- Describe Universal Transverse Mercator (UTM)
- Describe State Plane Coordinate (SPC) System
- Map a delimited text file with XY coordinates and display different parts of the world using appropriate map projections

Module 3. Relational database

- Describe how attribute data are stored in a computer
- Format unstructured data in a normal form
- Perform SQL SELECT query on attribute data
- Manipulate attribute tables (e.g., add fields, calculate fields, table join)

Module 4. Cartography

- Describe how different thematic mapping techniques work
- Describe how different data classification methods work
- Articulate appropriate uses of visual variables (symbolization scheme) in map-making decision
- Discuss principles for organizing thematic content in the map
- Apply principles of map design to various map-making scenarios

Module 5. Spatial analysis

- Perform spatial query on vector data
- Describe how different overlay techniques work
- Describe how inverse distance weighting works
- Discuss appropriate uses of map algebra
- Conduct site suitability analysis using both vector and raster operations

Module 6. GIS for community development

- Articulate how GIS helps build different forms of community capital (natural to social capital)

9. Access to ArcGIS

Labs with ArcGIS Desktop: SAC GIS lab (SAC 224), SAC 268, 990 GIS lab (990 W Fullerton, Room# 3135), Richardson Library, Loop Library, Daley 1327

GIS lab open hours

- 990 GIS Lab (990 W Fullerton, Room# 3135): https://las.depaul.edu/academics/geography/geographic-information-systems-certificate/Pages/gis-lab.aspx or the lab door.
- SAC GIS lab (SAC 224): http://qrc.depaul.edu/hours.htm or the lab door.

Install ArcGIS in your Windows personal computer: ArcGIS is ONLY supported in Windows computer. If you're enrolled in GIS classes at DePaul University with an ESRI site license, you will receive a digital student license via email. If you have an Apple computer, use DePaul Virtual Lab.

To access ArcGIS in both PC and Mac remotely: go to DePaul Virtual Lab http://vlab.depaul.edu. Quality of user experiences vary by internet speed. At least 8 Mbps is recommended. If you have an issue with using Virtual Lab, contact a GIS coordinator.

10. Miscellaneous

Attendance/Absentee Policy: Consistent with university's policy, all students are expected to attend class meetings. Unless absence is explained on medical or compassionate grounds (documentation is required), absence from any classes is grounds for a grade adjustment.

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

Harvard Referencing Style

(a) Reference Lists: Reference lists must be in alphabetical order by author's last name. Items by the same author must be in chronological order. Indent all but the first line of the citation. Please use the following style: When referencing a direct quotation:

Knox and Pinch (2000: p.172) argue that "social polarization has been taking place."

When referencing an idea: According to Knox and Pinch (2000), there has been social polarization.

(b) Books: Knox, Paul and Steven Pinch. 2000. Urban Social Geography: An Introduction.4thed. Englewood Cliffs, NJ: Prentice Hall.

(c) Book chapters in an edited collection: Beauregard, Robert A. 1986. The Chaos and Complexity of Gentrification. In Smith, Neil and Peter Williams, eds. Gentrification in the City. Boston: Allen and Unwin: 35-45.

(d) Journal articles: Borchert, John R. 1967. American Metropolitan Evolution. The Geographical Review 57(3): 301-332.

(e) Internet articles: Gray, Geoffrey. 2003. Bad for Business: Budget Cuts Threaten Small Manufacturers. City Limits Weekly #411. www.citylimits.org. Accessed May 5, 2008.

11. 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.