GIS for Design Practices | A6939-1| Fall 2023

Columbia University Graduate School of Architecture, Planning and Preservation
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Course website: https://gisfordesignpractices.github.io/GISforDesignPractices-materials-fall2023/
Slack workspace: gisfordesignpractices.slack.com

Weekly Schedule & Location:

Lecture & Exercises
Friday 11 AM - 1 PM
300 Buell South

Office Hours:
By appointment.

Course Description:
GIS for Design Practices introduces geospatial technologies tailored to participatory, community-based research and activist agendas for urban spaces. The class explores open source desktop and web-based geospatial toolsets for research, design, and visualization of urban conditions, as well as strategies for intervention and transformation of issues and challenges facing urban communities. Students will gain valuable experience in harnessing open data and creating innovative mapping tools with local urban communities.

Weekly lectures will cover the history, underlying fundamentals, tools, and programming languages required to make use of GIS and the geographic web. In-class activities will introduce technical fundamentals for each week's topics, followed by weekly assignments where students can master the skills necessary for interactive mapping. Throughout the course, students will balance their efforts between individual research and assignments. During the latter phase of the course, students will develop interactive mapping projects that address specific local community challenges. These projects will feature opportunities for students to engage local communities, ground their emerging geospatial skills in real-world urban issues, and draw significant thematic connections broadly with their ongoing urban studies.

Course Themes:

- Open Source GIS Software
- Desktop and online GIS
- Strategies for creating desktop and online cartography
- Participatory GIS
- Critical cartography and GIS
- Collaborative online mapping
- Programming for interactive maps

Learning Outcomes:

By the end of the semester, successful students will:

- Demonstrate a solid working knowledge of GIS and interactive mapping technologies.
- Articulate and develop research and data collection strategies around a unique research topic in geospatial technology for urban communities.
- Articulate their own understanding of research, data, and GIS processes through a final project and presentation.
- Participate in class discussions and in-class exercises, as well as conduct independent research and weekly GIS / interactive mapping exercises (lab sessions will allow mastery of broad concepts, but students will ultimately be responsible for completing each week's technical exercise out of class).
- Demonstrate their ability to translate and migrate GIS data to other spatial technologies in both desktop and online environments.
- Articulate how GIS and the geographic web relates to other spatial modeling techniques for urban design.
- Develop their own interactive mapping project reflecting their mastery of geospatial technologies as they relate to their own research topic.
- Apply concepts and skills to their future work in urban design.
- Utilize technical, quantitative, and qualitative mapping/ethnographic knowledge in the context of local urban communities, neighborhood development, and their spaces.
- Contribute to the course archive, creating a resource for project community partners and future students.

Course Outline (subject to change):

Class 1 September 8	Introduction to GIS *Activity:* Latitude and Longitude.
Class 2 September 15	Cartographic design & conventions. Projections and coordinate systems. *Activity:* Desktop GIS basics. Managing projections and coordinate systems. *Readings.* Map design and symbology ● How to Lie with Maps, *excerpt* (Monmonier) ● Designing Better Maps, *excerpt* (Brewer)
Class 3 September 22	Thematic and choropleth maps. Participatory GIS. *Activity:* Desktop GIS: Opening CSVs. Categorized Maps. Choropleths and counting points in polygons. *Readings.* Data classification

- The Basics of Data Classification (Axis Maps)
- Telling the Truth *(UX Blog)*

Readings. Participatory GIS and Data Feminism

- What Would a Feminist Data Visualization Look Like? (Catherine d'Ignazio)
- "On feminist technology for housing justice," in *Feminist Designer: On the Personal and Political in Design*, pages 69-71, MIT Press.
- Grassroots mapping: Creating a participatory map-making process centered on discourse (Public Laboratory for Open Technology and Science)

Class 4
September 29

Geoprocessing: proximity, overlay, and extraction. Georeferencing.

Activity: Desktop GIS: Feature proximity, overlay, and extraction operations. Georeferencing.

Readings. TBD

Class 5
October 6

Joining data. Attribute joins, census data, and spatial joins.

Activity: Desktop GIS: Join census data to spatial data and make a map.

Readings. TBD

Video. Abolish Big Data, Data for Black Lives, excerpt: 29:25-40:25.

Class 6
October 13

Modeling & Critical Cartography

Activity: Critical cartography panel with the Anti-Eviction Mapping Project & Inside Airbnb

Readings. Using spatial models to predict and prevent displacement

- Forewarned: The use of early warning systems for Gentrification & Displacement (Chapple & Zuk)
- To Stop Displacement, Disclose the Data (Jost)
- Check out Displacement Alert Project (ANHD)

Readings. Critical cartography

- An introduction to critical cartography (Crampton & Krygier)
- Counter-mapping evictions in San Francisco & New York City (McElroy, Raby, and Vergerio)
    - Skim: Anti-Eviction Mapping Project handbook
- Check out websites for panelists
    - Anti-Eviction Mapping Project
    - Inside Airbnb

Optional. Additional critical cartography projects to peruse

- Manual de Mapeo Colectivo (scroll down for english version)
- Undesign the Redline (Designing the We)
- St Louis Map Room (Jer Thorp)

- An Atlas of Radical Cartography (Mogel & Bhagat)

Class 7 October 20	Web Mapping with Felt *Activity:* Using Felt *Readings:* TBD
Class 8 October 27	Preparing Data for the Web *Activity:* Using QGIS and other tools to get data ready to be published. *Readings:* How cops use maps. ● CompStat 2.0 (NYPD) ● Policing Is an Information Business (Urban Omnibus) ● White Collar Crime Risk Zones (The New Inquiry) (Please note that this is satirical.)
Class 9 November 3	Using Mapbox *Activity:* Making a basemap with Mapbox Studio. *Readings:* Mapping population flows. ● American Panorama: Foreign-Born (University of Richmond) ● Mapping Migration in the United States (NYT)
Class 10 November 10	Other Systems for Web Mapping *Activity:* Working with other web mapping tools. *Readings*: TBD
Class 11 November 17	Web Mapping APIs and other Data Sources *Activity:* Using APIs to augment your data and find new datasets. *Readings:* On OpenStreetMap ● Introduction to OpenStreetMap ● Who Maps the World? (Bloomberg Maplab) ● Investigating war crimes, animal trafficking, and more with open source geospatial data (FOSS4G conference talk)
Class 12 November 24	NO CLASS - Thanksgiving.
Class 13 December 1	Final Project Lab
Class 14 TBD	Final Review - December 14 or 15, TBD with students.

Reading Assignment:
Throughout the course, we have assigned readings to help students develop a critical and theoretical framework around their mapmaking practice. Students will be required to choose one week for which to write a short response (150 - 200 words) based on the readings. Responses will be posted on the #readings channel on the GIS for Design Practices Slack space.

Additional Recommended Readings:
In the early and middle phases of the course, students will be required to develop a conceptual and theoretical framework for the various geospatial technologies covered in the course. Students will be provided PDF reading files, URLs and textbook excerpts. Each week students will be offered access to additional reading materials. Students are encouraged to pursue these recommended readings, especially for those components of the course that relate directly to student's interest or study focus.
In addition to these provided recommended readings, there are some books that may prove useful:

Bolstad, Paul. *GIS Fundamentals: A First Text on Geographic Information Systems*. ISBN: 978-0971764736
This is an excellent, relatively exhaustive and system-agnostic look at the field of GIS. Students looking for additional conceptual material should consider this book.

Crampton, Jeremy. *Mapping: A Critical Introduction to Cartography and GIS*. ISBN: 978-1405121729
Crampton's survey of critical cartography and GIS is a good start for those new to the areas.

Monmonier, Mark. *How to Lie with Maps*. ISBN: 978-0226534213
This is a much quicker and simpler read than Wood's and Crampton's works above. Monmonier focuses on how the design of a map can lead the reader to understand the underlying data and landscape in dramatically different ways. As such, it's a decent primer on cartographic design with a mildly critical spin.

Menke, Kurt. *Discover QGIS 3.x*. ISBN: 978-0998547763
This book is an extensive walkthrough of the features available in QGIS If you're looking for more help with using QGIS this is a good place to start. Available online at Locate Press.

Wilson, Matthew W. *New Lines: Critical GIS and the Trouble of the Map*. ISBN: 978-0-8166-9853-0
Wilson's relatively short book is well-written, critical look at GIS from one of the more interesting recent researchers in the field of mapping and GIS.

Materials:
Course lecture topics, readings and in-class exercise data will be available on Canvas, but each student will be required to organize and maintain their own GIS data files, especially pertaining to the final project. During each class session, reading materials, GIS files and your notes can be on your local folder in the lab; however, you are responsible for taking this data with you and bringing it back for the next session. When moving GIS files and research materials back and forth, a **USB drive** or **online backup** is ideal. Even when working on your own laptop, you are responsible for backing up the data.

Course Policies:
Email: Students are required to maintain and check their Columbia email account on a regular basis except over official breaks.

Announcements will be sent through Slack, and students are expected to send technical questions in Slack.

Please email or message the instructor directly (1) when discussing personal matters or (2) as a secondary resort when working on assignments.

Assignments: Students are required to submit completed assignments via Canvas. Students should work through class assignments before the deadline to be certain they understand the technical challenges of each assignment and finalize these assignments prior to assignment deadlines. **Assignments turned in up to one week past their due date might incur a 25% penalty. Assignments might not be accepted more than one week after their due date.**

Academic Honesty: Compromising your academic integrity may lead to serious consequences, including (but not limited to) one or more of the following: failure of the assignment, failure of the course, academic warning, disciplinary probation, suspension from the university, or dismissal from the university. Because intellectual integrity is the hallmark of educational institutions, academic dishonesty is one of the most serious offenses that a student can commit at Columbia GSAPP. A failing grade in the course is a minimal penalty. For a full description of GSAPP's plagiarism policy, please read here:
https://www.arch.columbia.edu/plagiarism-policy
Adaptations: If you need course adaptations or accommodations because of a disability or emergency medical information that needs to be shared with the instructor, or if you need special arrangements please bring it to the instructor's attention as soon as possible.

Attendance: Participation is an essential part of class and includes: keeping up with reading, contributing meaningfully to class discussions, active participation in group work, and attending synchronous sessions regularly and on time. Students are expected to keep up with class activities and requirements each week.

Otherwise, it is your responsibility to make up work missed due to an absence. If you know that you will miss a class you should notify the instructor in advance - it will be much easier for both you and the instructor to make arrangements early-on.

Courtesy: We plan on covering a great deal in a short timeframe and will need all of our class time to do this. Please come to class meetings on time and close applications that may lead to distractions during class meetings.

Evaluations and Grading:

Evaluation for this course occurs across several performance expectations: weekly technical assignments/projects, independent research and data development, final project, and course participation. Through the early and middle phases of the course, students will complete weekly assignments which expand upon the weekly lab sessions. In the later phase of the course weekly assignments will give way to concentration on final course projects. Projects will be evaluated according to the conceptual preparation of the project, the results of the project, and the project presentation.

Weekly technical assignments 30% Participation and attendance 20% Final project and presentation 50%

All students registered in the GSAPP are graded as described below:

- **HP** (high pass) = a superior level of work
- **P** (pass) = an acceptable level of work
- **LP** (low pass) = work that meets minimal standards
- **F** (fail) = work that is unsatisfactory
- **UW** (unofficial withdrawal) = assigned to students who miss more than three required classes or whose names appear on the grade sheet but who have discontinued attendance
- **INC** (incomplete) = may only be used if a student has approval from the Admissions Office for proven illness