USP 436/536: GIS For Urban Studies & Plan

Syllabus for GIS For Urban Studies & Plan Spring 2026

Nohad A. Toulan School of Urban Studies & Planning Portland State University Spring 2026

Hours: Mondays and Wednesdays from 1:30 pm to 3:10 pm.
Location: This class meets in person at Fariborz Maseeh Hall, B157 (in the basement)

Instructor: Liming Wang, Ph.D., Associate Professor
Email: lmwang@pdx.edu
Office Hours: Mondays 11:00am – 1:00pm
Office: URBN 350D or via Zoom (**https://pdx.zoom.us/j/5037255130**)

Teaching Assistant: Gabriel Quiñones - Zambrana
Email: ggq@pdx.edu
Office Hours: TBD

Credits: 4 credit hours
Course Website: This class uses Canvas (**canvas.pdx.edu**) in support of learning. You can log in with your Odin username and password.

Prerequisite for USP 436: For undergraduate students taking USP 436, prior experience with Microsoft Excel or other spreadsheet program is strongly recommended.

Class Description

USP 436/536 provides an overview of the theory, application, and representation of geographic data specific to urban settings, equipping students with essential skills for careers in planning and community development. USP 536 is a required core course for graduate students in the Master of Urban and Regional Planning (MURP) program, while USP 436 is one of the core skill courses for BA/BS in Community, Urban Studies, and Planning. The course is designed for both undergraduate and graduate students interested in urban issues who want to learn the theoretical foundations of spatial thinking and the practical applications of GIS software commonly used in the field. This course will cover:

- Introduce the basic principles of GIS, its functionalities, and its real-world applications across planning disciplines, demonstrating how GIS supports tasks like land use analysis, site selection, and infrastructure management.
- Cover different types of spatial data (e.g., vector, raster), their characteristics, and methods for data acquisition, focusing on data crucial for planning such as parcels, zoning, demographics, and environmental features.
- Explain how geographic locations are represented on maps using coordinate systems and projections, essential for accurately mapping lots, zoning, and infrastructure commonly used in planning.
- Teach students basic cartographic principles for creating effective and informative maps (including elements like scale, legend, and symbology)
- Familiarize students with popular GIS software like ArcGIS or QGIS, covering basic functionalities like data import, visualization, querying, and spatial analysis tools

- Teach methods for data input (e.g., digitizing plans) and data management techniques like attribute tables, critical for maintaining and updating common planning datasets.
- Introduce basic spatial analysis concepts including geo-processing tools (e.g., buffer, overlay, spatial join). Students will gain hands-on experience applying these tools, which allow them to answer spatial questions relevant to planning, such as identifying areas suitable for development or assessing proximity to services.
- Briefly introduce students to other relevant geospatial technologies like GPS (for field data collection), Remote Sensing, and Lidar (for environmental analysis and 3D visualization), and more recent online GIS and web map tools
- Discuss ethical considerations in spatial data collection, analysis, and visualization, exploring issues like data privacy, bias, and potential misuse of GIS
- Showcase real-world examples of how GIS is used in different planning fields (e.g., transportation, housing, environmental planning) to illustrate the practical value and diverse applications of GIS knowledge.

Course Objectives

This course will provide the framework for meeting several learning objectives through lectures, in-class discussions, lab exercises, final projects, and presentations. The objectives focus on building skills directly applicable to planning and community development:

1. Understand basic GIS core concepts, theories, components, and its applications in urban studies and planning, including developing spatial reasoning, thinking, and data analysis techniques.
2. Use GIS software to create and manage data, perform spatial analysis, and communicate spatial analysis processes and results effectively through writing, mapping, and relevant descriptive statistics.
3. Develop spatial and quantitative analysis skills to effectively study issues in urban studies and planning; develop problem-solving and communication skills to address these issues within your field of study.
4. Through individual or group final projects, go through the process of crafting and implementing a plan to use spatial data and analysis and answer a specific research problem in your field of study, and effectively present the results in written, graphical, and verbal formats
5. Gain awareness of data quality, availability, and suitability for the planning problem at hand, as well as the limitations and social implications of using GIS. **(Graduate students only)** Critically analyze maps considering map-makers' positionality.
6. Leverage real-world data to expose and analyze hidden patterns of spatial inequality and social injustice. **(Graduate students only)** Equip graduate students with valuable skills to approach urban studies, planning, and implementation in a more informed, data-driven, and comprehensive way.
7. **(Graduate students only)** Provide students with real-world data, critical thinking skills, and the ability to visualize and advocate for a more sustainable future through GIS applications in climate change adaptation, sustainable urbanism, or green infrastructure planning.

Student Learning Outcomes

This course aims to equip students with a foundational understanding of Geographic Information Systems (GIS) and their applications. The specific learning outcomes include the following:

1. Students will explore different types of spatial data, their structures, and their limitations.

2. Students will master the skills for downloading, importing, manipulating, and exporting data in various formats and apply them in spatial thinking.
3. Students will gain proficiency in a specific GIS software and learn how to navigate the interface, manage data, create maps, and perform basic spatial analysis tasks.
4. Students will understand map design principles, create effective and informative maps, and present findings clearly to different audiences.
5. Students learn to apply GIS tools and techniques to address specific questions or solve real-world problems using spatial data, such as site suitability analysis or demographic change mapping
6. Students gain exposure to diverse career paths related to GIS in urban studies and planning.
7. **(Graduate students only)** Graduate students may involve group work in final projects, fostering collaboration and communication skills.
8. **(Graduate students only)** Graduate students learn ethical issues related to data privacy, spatial analysis bias, and responsible use of GIS technology.

Required Texts and/or Required Reading List

Required textbook for lab sessions: Kurland, Wilpen L. Gorr, Kristen S. *GIS Tutorial for ArcGIS Pro 3.1*. Available from: VitalSource Bookshelf, (5th Edition). Esri Press, 2023.

Textbook for weekly reading: Yiping Fang, Vivek Shandas, and Eugenio Arriaga. *Spatial Thinking in Planning Practice: An Introduction to GIS*. Available online at **http://pdxscholar.library.pdx.edu/pdxopen/4/**

Other reading materials will be provided by the instructor on the Canvas course website.

Computer/Software Access

Signing In ArcGIS Pro

If you already have a PSU ArcGIS Online account and a valid ArcGIS Pro license through the PSU AGO, then follow the steps below to sign in to ArcGIS Pro. If you don't have a PSU ArcGIS Online account or a valid ArcGIS Pro license, then see the "Activating an ArcGIS Pro License" section below.

1. Start ArcGIS Pro.
2. Click on "Your ArcGIS organization's URL" link on the logon dialog window.
3. Enter "pdxedu" as the prefix to the ArcGIS organization's URL. Click "CONTINUE."
4. Click on "PORTLAND STATE" button and log on with your PSU ODIN account credential.

Activating an ArcGIS Pro License

ArcGIS Pro is currently authenticated through PSU ArcGIS Online Portal. Users need to logon to PSU ArcGIS Online to activate their ArcGIS Account. See the **ArcGIS Online page** (Note: Link inferred, check PSU OIT for exact page) for information about using the PSU ArcGIS Online Portal.

PSU ArcGIS Online account activated after July 1, 2019 will have access to ESRI E-Learning and an ArcGIS Pro license assigned to the account automatically. There is no need to submit further requests. If your PSU ArcGIS Online account was activated before July 1, 2019 and that you have verified that you don't have an ArcGIS Pro license attached to your PSU ArcGIS Online account, then, after your AGO account is activated, please send your PSU ArcGIS Account ID (i.e., odin ID with _pdxedu suffix) to Geoffrey Duh (jduh@pdx.edu) to request an ArcGIS Pro license.

Access ArcGIS Pro via Virtual Computer Lab (VLAB): Please follow the directions to access VLAB: https://portlandstate.atlassian.net/servicedesk/customer/portal/2/topic/4ee04a3f-7d9e-417a-9831-a8d879d4701b/article/885653584

Install ArcGIS Pro on your own computer (for Windows Operating System Only): You can download ArcGIS Pro installation programs here. (Note: Link points to a Google Drive folder, requires PSU login) → You need to log on to your PSU ODIN account to access the Google share folder. Go to `ArcGISPro --> Version 3.5.x --> ArcGISPro_35_xxxx.exe`. Download the file and install it.

Additional GIS Resources for PSU Students: GIS Software (google.com) (Note: Link points to a Google Site)

Data for the labs are stored at: https://drive.google.com/drive/folders/1AILWUUUJo0wTIN0AfOMopBdDWwzguvov → Please download the data to your local drive to complete the tutorials.

You can also download the data directly from ESRI: https://links.esri.com/GISTforPro3.1Data and the assignments at https://links.esri.com/GISTforPro3.1Assignments

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Outline of Course Content

Week	Topic	Readings (Fang et al. unless otherwise specified)	Lab tutorial (Chapter in ArcGIS Pro tutorial)	UG Assignments	Grad Assignments
1	GIS Introduction	The unlikely history of the origins of modern maps	Chapter 1 Introducing GIS	Assignment 1-1	Assignment 1-1
2	Map Design	Chapter 1: Defining a Geographic Information System	Chapter 2 Map Design Chapter 3 Map for end users	Assignment 3-1	Assignment 3-1
3	Data Model and Topology	Chapter 3: Topology and Creating Data	Chapter 4 File Geodatabase	Assignment 4-2	Assignment 4-2
4	Projection and Census data	Chapter 2: Coordinate Systems and Projecting GIS Data Chapter 4: Mapping People With Census Data	Chapter 5 spatial data	Assignment 5-1	Assignment 5-2
5	Data collection and geocoding		Chapter 8 Geocoding	Assignment 8-2	Assignment 8-2
6	Geoprocessing	TBA	Chapter 6 Geoprocessing	Midterm	Midterm
7	Spatial Analysis I	TBA	Chapter 9 Spatial	Assignment 6-1	Assignment 6-2; Final

Week	Topic	Readings (Fang et al. unless otherwise specified)	Lab tutorial (Chapter in ArcGIS Pro tutorial)	UG Assignments	Grad Assignments
			Analysis		project proposal
8	Spatial Analysis II	TBA		Assignment 9-1	Assignment 9-1
9	Memorial Day No class				
10	Wrapping up; Project work		Working on final project		
11	Project presentation				

Notes: * Readings refer to chapters in the *Spatial Thinking in Planning Practice* open access textbook unless otherwise specified. * Lab Tutorials and Assignments refer to the *GIS Tutorial for ArcGIS Pro 3.1* textbook.

Course Requirements (exams, assignments, papers, etc.)

Weekly Assignments: The course assignments follow the textbook “GIS Tutorial for ArcGIS Pro 3.1”, which has both tutorial and assignment options. Students are required to go through each chapter’s tutorials individually to get familiar with GIS software applications. Each week they are required to complete an assignment in this book chosen by the instructor. The exact assignments for undergraduate and graduate students vary.

Midterm Exam: One online mid-term exam will be conducted through the Canvas website. The midterm exam will test the major spatial concepts students have learned through class lectures. If you’ve come to class, paid attention, and done well on all the assignments you will have little trouble with the exam. The exam is designed to ensure that you are on track with the basic principles of GIS so that you will be prepared to complete the project and can stay on schedule for the remainder of the class.

Final Project: The final project for all students is an opportunity to dive deep into GIS, using it to investigate a specific research question related to your interests. The structure of the final project is flexible. Your instructor will choose between individual and group projects based on learning objectives and course goals. The requirements for undergraduate and graduate students vary in details. Undergraduate students will work on projects with a scope and datasets provided by the instructor, while graduate students will develop their own project ideas and identify suitable datasets independently.

- **In general,** students are encouraged to carry out spatial analysis using the GIS software package you have been using in class. Performing a spatial analysis is the purpose of this project. In relation to the project topic, undergraduate students will be given a pre-defined project scope and

packaged datasets by the instructor. Graduate students will develop their own research questions, present their project proposals, and collect their own data from secondary sources. In relation to the project final presentation, undergraduate students will present their findings in the written form of “story maps”. Graduate students, on the other hand, will present their findings in the form of online interactive mapping, and present verbally to the whole class.

- The assessment of **graduate students’ project** will prioritize the clarity and coherence of final research question, the appropriateness of data analysis methods, and the effectiveness of chosen geoprocessing tools. A well-defined research question, a perfect fit of methods, and insightful analysis are the keys to project success, not number or complexity of analyses.
- **Specifically, Graduate students** will work on self-defined projects. There are three stages to the project:
  1. By the end of week 7, submit a one or two-page project proposal. It should include a research question, a detailed description of the spatial and attribute data you will use, and a conceptual description of the methods you will use. You must discuss the proposal with the instructor after turning it in.
  2. Schedule your presentation during finals week. Your presentation must include the following components: an Introduction, Datasets Used, Analysis Methods, Results, and Conclusions. You are required to turn in your final PowerPoint presentation.
- **Specifically, Undergraduate students** undergraduate students will be given several pre-defined projects from the instructor to choose from - the project will be like an extensive lab exercise, but with very few instructions. A written project report in the form of “story maps” must be submitted by the time of the final project exam period. The project report must include the following sections: an Introduction, Datasets Used, Analysis Methods, Results, and Conclusions.

Method of Evaluation (letter graded /calculation of course grade)

Grading Rubric

Category	**USP 436 (Undergraduate)**	**USP 536 (Graduate)**
Lab Assignments	60%	50%
Midterm	20%	20%
Final Project	20%	30%
Total	**100%**	**100%**

Course grades will be assigned on a criterion-reference scale as follows:

- A: 93.3-100%
- A-: 90.0-93.3%
- B+: 86.7-90.0%
- B: 83.3-86.7%
- B-: 80.0-83.3%
- C+: 76.7-80.0%
- C: 73.3-76.7%
- C-: 70.0-73.3%
- D+: 66.7-70.0%
- D: 63.3-66.7%

- D-: 60.0-63.3%
- F: <60.0%

In case that a grade is on the borderline, classroom participation will be used to determine the final grade.

COURSE POLICIES

Attendance Students are expected to attend every class. To be excused the student must notify his or her instructor in writing (acknowledged e-mail message is acceptable) prior to the date of absence if such notification is feasible. In cases where advance notification is not feasible (e.g. accident, or emergency) the student must provide notification by the end of the second working day after the absence. This notification should include an explanation of why notice could not be sent prior to the class. Students must provide additional documentation substantiating the reason for the absence that is satisfactory to the instructor, within one week of the last date of the absence. The instructor will either provide the student an opportunity to make up any graded activities or provide a satisfactory alternative to be completed within 30 calendar days from the last day of the absence.

Classroom participation Students are encouraged to come to class prepared, make thoughtful contributions to class discussions, respect others' views, and help each other out in collaborative learning groups.

Assignment guidelines Students are encouraged to have study groups and help each other with the assignment. However, the work submitted must be individual work. Plagiarism will be prosecuted.

Late Submission Policy In fairness to all students, especially those who work hard to meet deadlines, late assignments will be penalized 5% per day. Assignments more than 7 days late will not be accepted.

Academic Integrity Statement PSU's Student Code of conduct prohibits "All forms of academic dishonesty, cheating, and fraud, including but not limited to: (a) plagiarism, which includes, but is not limited to, word for word copying, using borrowed words or phrases from original text into new patterns without attribution, or paraphrasing another writer's ideas; (b) The buying and selling of all or any portion of course assignments and research papers; (c) Performing academic assignments (including tests and examinations) for other persons; (d) Unauthorized disclosure and receipt of academic information; and (e) Falsification of research data."

Access and Inclusion for Students with Disabilities PSU values diversity and inclusion; My goal is to create a learning environment that is accessible, equitable, inclusive, and welcoming. I am committed to fostering mutual respect and full participation for all students. If any aspects of instruction or course design result in barriers to your inclusion or learning, please notify me. Additionally, the Disability Resource Center (DRC) provides reasonable accommodations for students who encounter barriers in the learning environment. The DRC works with students who have physical, learning, cognitive, mental health, sensory, and other disabilities.

If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations.

If you already have accommodations, please contact me to make sure that I have received your faculty notification letter from the DRC so we can discuss your accommodations.

The DRC is located in 116 Smith Memorial Student Union, Suite 116. You can also contact the DRC at 503-725-4150 or, drc@pdx.edu. Visit the DRC online at **https://www.pdx.edu/disability-resource-center**.

Title IX Reporting Obligations Portland State is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment (sexual assault, domestic and dating violence, and gender or sex-based harassment and stalking). If you have experienced any form of gender or sex-based discrimination or sexual harassment, know that help and support are available. Information about PSU's support services on campus, including confidential services and reporting options, can be found on PSU's Sexual Misconduct Prevention and Response website at: **http://www.pdx.edu/sexual-assault/get-help**or you may call a confidential IPV Advocate at 503-725-5672 or schedule Online at **https://psuwrc.youcanbook.me**. You may report any incident of discrimination or discriminatory harassment, including sexual harassment, to:

- **PSU's Title IX Coordinator:** Julie Caron by calling 503-725-4410, via email at titleixcoordinator@pdx.edu or in person at Richard and Maureen Neuberger Center (RMNC), 1600 SW 4th Ave, Suite 830
- **Deputy Title IX Coordinator:** Yesenia Gutierrez by calling 503-725-4413, via email at yesenia.gutierrez.gdi@pdx.edu or in person at RMNC, 1600 SW 4th Ave, Suite 830

Please be aware that all PSU faculty members and instructors are required to report information of an incident that may constitute prohibited discrimination, including sexual harassment and sexual violence. This means that if you tell me about a situation of sexual harassment or sexual violence that may have violated university policy or student code of conduct, I have to share the information with my supervisor, the University's Title IX Coordinator or the Office of the Dean of Student Life. However, the Title IX Coordinators will keep the information confidential and refer you to a confidential advocate.

Submitting work online For assignments that require uploading files to Canvas, it is the student's responsibility to verify that (1) all files are submitted in Canvas prior to the deadline and (2) all submitted files are those that the student intends to be graded for the assignment. Submitting the "wrong" file by accident is not acceptable grounds for a deadline extension. Assignment grades will be based on the file submitted prior to the posted deadline. Files submitted in a format that cannot be accessed by the instructor cannot be graded and will therefore receive a 0. Acceptable file formats are MS Office formats (e.g. Word, Excel, PowerPoint) or PDF files. Individual assignment instructions may contain a required file format.

Technology access Proficiency in the use of Canvas, PSU email, and other computer tools such as Zoom or part of google suite is required for this course. This course requires consistent access to functioning computer equipment and Internet access throughout the length of the course. Reliance on a cellular connection may not provide reliable and fast access to online learning resources. Here are some broadband programs that are free or low-cost: **https://www.highspeedinternet.com/resources/are-there-government-programs-to-help-me-get-internet-service**