URBP 787.1M

Advanced Geospatial Methods for Environmental Planning

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Location: classes are online via Zoom: this …… Passcode: …..
Office Hours: by appointment

Pre-requisites: This course requires an intro GIS class as a pre-requisite. Students are assumed to have a fresh knowledge in using basic tools for analyzing vector and raster layers. In this course we will use ESRI ArcGIS, Python (Anaconda distribution), and Google Earth Engine. These software and programming packages require a general competency in using operating systems as well as basic quantitative data analysis knowledge. Students are encouraged to use online (Youtube, books, blogs, etc.) tutorials/courses to refresh their GIS skills before the beginning of the semester.

Course Overview

In this course, we will explore the challenges of urban planning in the changing climate. Our cities need to be prepared for emerging climate crises. More frequent and intense extreme weather events such as storms, heatwaves, and wildfires are expected to challenge our urban communities in the coming decades. Yet, our communities struggle to enhance their infrastructure while also addressing environmental and social inequalities. We need tools and techniques to understand the impact of climate variables, to identify vulnerable groups and geographies, and to measure the impact of policies on urban environments. Since urban systems are inherently complex, we need appropriate tools and methods for measuring such dynamics. Geospatial technologies have had remarkable advances in the past decade. Leveraging geospatial analysis for analyzing climate, social, and environmental systems allows us to understand how our policies, resources, and community planning efforts can be improved.

We will learn about available data sources to analyze the potential exposure to crises such as flooding, urban heat, coastal hazards, wildfire, and pandemics in American metropolitan areas. Although we will work on different climate zones, we will mostly focus on the city of New York. We will analyze urban ecosystem services, socio-economic contexts, and crisis response. We will learn advanced tools such as network analysis, raster analysis, spatial statistics, and machine-learning models in the context of urban and environmental planning.

Learning Objectives:

The learning objectives of this course include:

1- To learn about advanced geospatial methods
2- To learn about available public data sources for American metropolitan areas
3- To learn about the main challenges of urban resiliency
4- To learn the methods and theories of measuring socio-economic vulnerability

Sessions:

Week 1	Course plan, cities and extreme events Software installation and set up
Week 2	Urban microclimate science. Measuring urban surface temperature using Google Earth Engine
Week 3	Urban heat mitigation strategies. Cool roofs Python programming for measuring albedo using ortho images
Week 4	What is vulnerability? Using census data for building vulnerability indices.
Week 5	Urban heat exposure and vulnerability. Using socio-economic data to measure heat vulnerability index Raster analysis and spatial join
Week 6	Urban trees. Visualizing/analyzing LiDAR data to detect urban trees.
Week 7	COVID-19: mapping COVID-19 data in NYC. Who impacted? How can the impact be mitigated? Table join, spatial join, and scenario planning.
Week 8	COVID-19: building predictive models using machine-learning algorithms. Python/Scikit Learn.
Week 9	COVID-19 spatial modeling Spatial statistics and spatial autocorrelation model.
Week 10	Agent-based models for pandemic scenarios
Week 11	What happened in hurricane Sandy? Mapping flood zones, using DEM data for running flood scenarios
Week 12	Flood risk and regional land cover change. Land management and flood mitigation. Raster analysis and flow models.
Week 13	Evacuation models Network analysis for penetration and evacuation models.
Week 14	Wildfires. Why are they happening? Where are they happening?
Week 15	Sensors and crowed-source geospatial data
Week 16	**Reading Day**

Evaluation:

Students will be evaluated based on class engagement, reading/video assignments, major assignments, and the final project. Students need to prepare for each class by reading the assigned reading materials, watching the video tutorials, and for some sessions submitting the related assignments. There will be four major assignments that require 8-10 hours of work. The final project will be 30% of the final grade and requires significant work and effort during the second half of the semester. Students will need to design a project (with a research question), review the literature and theories, identify related data, propose appropriate methods/tools/theories for evaluation, and finally visualize and present the results. The final projects must have design components, design impact measurements, policy evaluation, and theoretical reflections.

Reading/video assignments (7 assignments)	35%
Major assignments (4 assignments)	35%
Final project	30%

Required Readings

There are two required books for this course:

Mitchell, A., & Minami, M. (1999). *The ESRI guide to GIS analysis: geographic patterns & relationships* (Vol. 1). ESRI, Inc..

Mitchel, A. (2005). The ESRI Guide to GIS analysis, Volume 2: Spartial measurements and statistics. *ESRI Guide to GIS analysis*.

Academic Integrity

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

ADA Policy

In compliance with the ADA and with Section 504 of the Rehabilitation Act, Hunter College is committed to ensuring educational access and accommodations for all its registered students. Hunter College's students with disabilities and medical conditions are encouraged to register with the Office of AccessABILITY for assistance and accommodation. For information and appointment contact the Office of AccessABILITY located in Room E1214 or call (212) 772-4857 /or VRS (646) 755-3129.

Hunter College Policy on Sexual Misconduct

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College reaffirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationships.

Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College's Public Safety Office (212-772-4444).
b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barry@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.

CUNY Policy on Sexual Misconduct Link:"

Camera and audio policy:

Please be aware that the instructor in this course will require that the camera be on during class sessions.

Recoding Zoom Meetings:

I am not planning to record the meetings. In case we decide to do so, I will get your consent, and everyone will be informed. The following policy is the standard language provided by the school:

Students who participate in this class with their camera on or use a profile image are agreeing to have their video or image recorded solely for the purpose of creating a record for students enrolled in the class to refer to, including those enrolled students who are unable to attend live. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.

CUNY Policies

Online courses are subject to the same CUNY policies as are in-person courses regarding academic integrity, the acceptable use of computer resources, equal opportunity and non-discrimination, sexual misconduct, workplace violence, domestic violence, and reasonable accommodations for persons with disabilities.

CUNY Academic Integrity Policy: https://www.cuny.edu/about/administration/offices/legal-affairs/policiesprocedures/academic-integrity-policy/

CUNY Policy on Acceptable Use of Computer Resources: https://www.cuny.edu/wpcontent/uploads/sites/4/page-assets/about/administration/offices/cis/itpolicies/ComputerUsePolicy1.pdf

CUNY Policy on Acceptable Use of University Data in the Cloud: https://www.cuny.edu/wp-content/uploads/sites/4/pageassets/about/administration/offices/cis/information-security/security-policiesprocedures/Acceptable-Use-of-University-Data-in-the-Cloud-2019-8-19a.pdf

and related Data Classification Standard:

https://www.cuny.edu/wpcontent/uploads/sites/4/page-assets/about/administration/offices/cis/information-security/security-policiesprocedures/Data-Classification-Standard-CUNY-2019-8-19a.pdf

CUNY Intellectual Property Policy:

https://www.cuny.edu/wpcontent/uploads/sites/4/page-assets/about/administration/offices/legalaffairs/policies-procedures/Intellectual-Property-Policy.pdf

CUNY information on copyright:

https://www.cuny.edu/about/administration/offices/legal-affairs/intellectualproperty/copyright-materials/

CUNY Equal Opportunity and Non-Discrimination Policy:

https://www.cuny.edu/about/administration/offices/legal-affairs/policiesprocedures/equal-opportunity-and-non-discrimination-policy/

CUNY Policy on Sexual Misconduct:

http://www.cuny.edu/wpcontent/uploads/sites/4/page-assets/about/administration/offices/legalaffairs/policies-procedures/Sexual-Misconduct.pdf

CUNY Campus and Workplace Violence Prevention Policy:

https://www.cuny.edu/wp-content/uploads/sites/4/pageassets/about/administration/offices/legal-affairs/CUNY-Campus-and-WorkplaceViolence-Prevention-Policy-2.28.11-and-amended-9.26.2011.pdf

CUNY Domestic Violence and the Workplace Policy:

http://policy.cuny.edu/generalpolicy/article-v/#policy_5.061

CUNY Procedures for Implementing Reasonable Accommodations and Academic Adjustments:

https://www.cuny.edu/about/administration/offices/legalaffairs/policies-procedures/reasonable-accommodations-and-academicadjustments/