

GTECH 36100

GIS Analysis

Fall 2024

Tuesday 5:30 – 8:15 PM

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Zoom Meeting ID: 735 204 6101

Course Description and Objectives

Building upon the contents of GTECH 20100, where emphasis is on representing geographic locations and spatial relationships in basic GIS data structures, this course extends that to spatial databases, 3D analysis, network analysis, raster analysis, point pattern and clustering, field and surface analysis, and other advanced GIS topics. The focus of this course is to develop geoprocessing workflows composed of a sequence of spatial analyses. While most techniques have a geographic origin, we will address all geo-spatially relevant methods in various disciplines like natural resources, environmental studies, and social sciences, to name a few. On the practical side, we primarily focus on ArcGIS Pro. Each student will need to conduct an individual course project that is related to GIS analysis. Students need to choose a project topic, collect necessary data, and produce a project report in the form of a poster, a paper, and/or a WebGIS. More detailed instructions on the project will be provided on Blackboard.

Learning Outcomes

At the end of the semester, students should be able to

- design spatial databases and perform spatial query, filtering, and join
- describe spatial relationships in GIS analysis with quantitative methods
- explain the basics of raster, network, surface, and overlay analyses
- produce and edit simple models or scripts to automate GIS tasks; and
- describe spatial decision support systems either stand-alone or as part of a larger application

Textbooks

The course does not have required books.

Recommended:

- de Smith M, Goodchild, M, and P Longley 2024. *Geospatial Analysis*, 7th Ed. Leicester: Winchelsea Press. Free access at <http://www.spatialanalysisonline.com/>
- Mitchell, A. and Griffin, L. (2020). *The Esri Guide to GIS Analysis, Volume 1, 2, 3*. 2nd Edition. Redlands, CA: Esri Press.
- Gorr, W. L., Kurland, K. S. (2021). *GIS Tutorial for ArcGIS Pro 3.1*. Redlands, CA: ESRI Press. ISBN-13: 9781589486805
- O'Sullivan, D. and Unwin, D.J. 2010. *Geographic Information Analysis*. Hoboken, NJ: Wiley. ISBN 978-0470288573
- Longley, P. A., Goodchild, M. F., Maguire, D. J., Rhind, D. W. (2015). *Geographic Information Science and Systems*, 4th Ed. Hoboken, NJ: Wiley. ISBN 978-1118676950.
- Worboys, M. and M. Duckham 2004. *GIS: A Computing Perspective*. CRC Press. ISBN 978-0415283755

Pre-requisite

GTECH 20100: Introduction to Geographic Information Science

Syllabus Change Policy

Except for changes that substantially affect the implementation of the evaluation (grading), this syllabus is a guide for the course but is subject to change with advance notice. Changes will be announced in class and on Blackboard, which students are expected to check regularly during the semester.

Week	Session	Date	Topic	Lab & Project
1	1	9/3	Introduction	Lab 0 (optional warm-up)
2	2	9/10	Geodatabases, Spatial Queries	Lab 1
3	3	9/17	Geodatabases, Validation and Optimization	Lab 1
4	4	9/24	Map Algebra and Raster Analysis	Lab 2
5	5	10/1	Point Pattern and Clustering Analysis	Lab 3
6	6	10/8	Networks and Topology	Lab 4
7		10/15	No Class, Follow Monday Schedule	
8	7	10/22	Network Analysis	Lab 4
9	8	10/29	3D and Surface Analysis	Lab 5
10	9	11/5	Spatial Interpolation	Lab 5, Project Proposal
11	10	11/12	Advanced Overlay Analysis	Lab 6
12	11	11/19	Model Building using Scripting Tools	Exam Review and Project Development
13	12	11/26	Exam (online)	
14	13	12/3	Advanced Cartography and WebGIS	Project Development
15	14	12/10	Spatial Decision Support	Project Development
16	15	12/17	Project Presentations	Project Presentation
17		12/20	Last Friday of the Semester	Final Project Paper/Poster

Criteria for Evaluation

Evaluation of academic performance is based on the following components and breakdowns.

Lab exercises	40%
Exam	20%
Participation	15%
Project Proposal	5%
Project Presentation	10%
Final Project Report	10%

Numeric scores will be used throughout the semester. The course letter grade will be determined only at the end of the semester, although guidance as to letter grade standing will be given along the way. Assignments are due six days after given in class. It is in your best interests to meet deadlines for assignments. There are no "extra-credit" assignments. Unless otherwise instructed, you will submit assignments in electronic forms through Blackboard.

To gain practical skills, exercises using ArcGIS Pro are expected for each week, although we only have six lab assignments counted towards the final grade. All lab assignments are designed at about 4-hour workload on average for those who have the necessary basic GIS skills. It is not uncommon for some who need to spend significantly more time on lab works due to their training in GIS basics or their choice of working out problems on their own instead of asking the instructor questions timely. Students in the class are strongly encouraged to install ArcGIS Pro software on their own computers. The computer labs are open 24/7 (also virtually online through [CUNY Apporto](#)) and all students can use the computer labs at any time outside of the posted instruction times for other courses.

Each of the students in the class will need to conduct an individual GIS project that involves the analysis of a substantial geographical or spatial problem. There are no requirements with respect to the application area (field). Everyone in the class is responsible for collecting the necessary data for her or his own project. Essentially, students can choose whatever topic, provided it is related to geographical analysis. Note that each student in the class is fully responsible for her or his own project, for which the instructor will help evaluate its feasibility. A few ready-made projects are available, but experience shows that motivation increases when students take pride in their own projects.

Incomplete (IN) and Credit

The instructor cannot accommodate students who are late in their work or do not show up for the exam or presentation. Unless you produce a medical certificate, letter from the Office of Accessibility, or other verified hardship, the instructor will not give the final grade of INC (incomplete). Graduate students are not eligible for Credit/No Credit as a final grade.

Policies

Attendance

Attendance is crucial. Given that the class-learning environment is active learning, meaning that most your performance is practical assignments rather than tests, adherence to protocols and the course timetable is very important. Class participation includes timely attendance at lecture and laboratory sessions, participation in organized class discussions, and timely asking questions for lab assignments and project works. Each one is expected to behave respectfully towards the instructor and other students, by not imposing a dominating or threatening presence in conversations and discussions, and by allowing others to speak and be heard.

Course Website

Web-enhancement in the context of this course means that everything pertaining to this course will be communicated through [Blackboard](#). You are required to check the Blackboard course site on a daily basis. All changes to the syllabus will be announced on the course home page. Your exams and lab assignments will be

graded based on what you have uploaded to Blackboard and that is where you will find your grades and may access course statistics that help you to assess your standing at any given time.

Communication

All email messages about this course should use your official Hunter or CUNY emails. Also check and see if the email that you registered in the Blackboard system is updated. [Professionalism](#) and “*netiquette*” are expected in the communication through emails. If your emails are not replied to in a timely fashion, please consider rewriting your emails in a better way.

Preferred Names and Pronouns

All people have the right to be addressed and referred to in accordance with their personal identity. In this class, we will have the chance to indicate the name that we prefer to be called and, if we choose, to identify pronouns with which we would like to be addressed. The instructors will do their best to address and refer to all students accordingly and support classmates in doing so as well.

General Lab Policies

Lab policies are described in detail in <http://www.geo.hunter.cuny.edu/techsupport/rules.html>.

Hunter College Policy on 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.

Hunter College’s Policy on Students with Disabilities:

In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical and/ or Learning) consult the Office of AccessABILITY located in Room E1124 to secure necessary academic accommodations. For further information and assistance please call (212-772-4857)/TTY (212-650-3230).

Hunter College Policy on Sexual Misconduct

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College affirms 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 relationship. 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. 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, on contacting the College’s Public Safety Office (212-772-4444)

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.barr7@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.

Policy on Sexual Misconduct can be found at <http://www.hunter.cuny.edu/diversityandcompliance/title-ix>