

# GTECH 73200

## Advanced Geoinformatics

Spring 2019  
Thursday 5:35 – 8:25 PM

**Instructor:** Shipeng Sun  
**Office:** HN 1043  
**E-Mail:** shipeng.sun@hunter.cuny.edu

**Class room:** HN 1090B-2  
**Office hours:** Tu 2-4pm, Th 3-5pm  
**Phone:** 212-396-6039

### Course Description and Objectives

Building upon the contents of GTECH 70900, where emphasis is on capturing geographic relationships in basic spatial 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 topics in Geoinformatics. A focus of this course is the development of spatial analysis models and geoprocessing workflows. 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 will focus on ArcGIS. 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 at the Blackboard course website.

### Learning Outcomes

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

- build 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 scripts or models to automate GIS tasks; and
- apply basic spatial decision support systems either stand-alone or as part of a larger application

### Textbooks

Recommended:

- Allen, David W (2009). GIS Tutorial 2: Spatial Analysis Workbook (for ArcGIS 10.1). Redlands, CA: ESRI Press. ISBN-13: 978-1589483378
- de Smith M, Goodchild, M and P Longley 2016. Geospatial Analysis. Leicester: Winchelsea Press. Free access at <http://www.spatialanalysisonline.com/> or as Amazon Kindle ebook (no ISBN)
- Rowlings B 2015. [Spatial Cheatsheet](#)
- O'Sullivan, D. and Unwin, D.J. 2010. Geographic Information Analysis. Hoboken, NJ: Wiley. ISBN 978-0470288573
- Longley, PA, Goodchild, M. Maguire, D. and D. Rhind 2015. Geographic Information Science and Systems. 4<sup>th</sup> edition, Hoboken, NJ: Wiley. ISBN 978-1118676950.
- Worboys, M. and M. Duckham 2004. GIS: A Computing Perspective. CRC Press. ISBN 978-0415283755

### Pre-requisite

GTECH 70900: Introduction to Geographic Information Science, preferably also GTECH 71000: Concepts and Theories in Geoinformatics

## Criteria for Evaluation

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

Lab exercises	30%
Exam	30%
Participation	10%
Project Proposal	5%
Project Presentation	5%
Project Report	20%

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. Incomplete grades and time extensions are not an option for this course. There are no "extra-credit" assignments. Unless otherwise instructed, you will submit assignments in electronic forms through BlackBoard.

To gain practical skills, lab exercises are also required each week. Lab exercises may also include reading questions related to the core concepts or techniques discussed in the lecture. All labs exercises and 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 software on their own computers. The computer labs are open 24/7 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, semester-long GIS project that involves the analysis of a substantial geographical or spatial problem. There are no requirements with respect to software. In a similar vein, the application area (field) is also the choice of each student. Everyone in the class is also responsible for gathering the necessary data for her or his own project. Essentially, students can choose whatever topic, provided it has to do with 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. And, unless you produce a medical certificate or letter from the Office of Accessibility, the instructor will not give the final grade of IN (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. I will be on time. So you will also be on time. It's just common courtesy. Lateness in arriving at class, both lectures and laboratory/discussion sections will not be tolerated. Active involvement in the course is evidenced in part by undertaking the mechanics of the practical assignments systematically, and learning the tools by hours of practice. In so doing the tools soon come to be seen as a means to an end, rather than the end themselves. For example, you will make many maps, and may get caught up in this creative activity, but remember that the maps are being made for particular scientific purposes. Class participation includes timely attendance at laboratory sessions, participation in organized class discussions, accomplishments of in-class

tasks, accomplishment of the preliminary assignment on time, and participation in the map poster display (if this is a part of the course this semester). Remember that a good part of your grade depends on class participation. Of course, you are expected to behave respectfully towards the instructor and the other students, by not imposing a dominating or threatening presence in conversations and discussions, and by allowing others to speak and be heard, especially if they are shy and their voice weaker than yours.

### ***Electronics in the classroom***

Electronic recording devices are allowed during lectures. All other personal electronics should be turned off before coming into the classroom. This includes cell and smart phones. Computers may be used for taking notes and doing the lab exercises, and if you use them for activities not related to classroom content (personal e-mails, Facebook chats, surfing the Internet for fun ...), you will be asked gently, but firmly, to turn them off.

### ***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. All lecture and lab materials are accessible through BlackBoard, and Blackboard is also the place where you upload your assignments. 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 include GTECH 73200 in the subject line, and be signed with your full name as it appears in CUNYfirst. 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.

### ***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.

### ***ADA Policy***

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 E1214B, to secure necessary academic accommodations. For further information and assistance, please call: (212) 772-4857 or (212) 650-3230.

### ***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: <http://www.cuny.edu/about/administration/offices/Ja/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf>

### Syllabus Change Policy

Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and 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
1	1	01/31/19	Introduction
2	2	02/07/19	Geodatabases, Spatial Queries, and Spatial Join
3	3	02/14/19	Geodatabases Validation and Optimization
4	4	02/21/19	Map Algebra and Raster Analysis
5	5	02/28/19	Point Pattern and Clustering Analysis
6	6	03/07/19	Networks and Topology
7	7	03/14/19	Network Analysis
8	8	03/21/19	3D and Surface Analysis
9	9	03/28/19	Spatial Interpolation
10	10	04/04/19	Advanced Overlay Analysis
11	11	04/11/19	<b>Exam</b>
12	12	04/18/19	Scenario Building using Scripting Tools
13		04/25/19	<b>No Class, Spring Recess</b>
14	13	05/02/19	Advanced Cartography and WebGIS
15	14	05/09/19	Spatial Decision Support
16	15	05/16/19	Project Presentations