Syllabus for GTECH 73200
Advanced GeoInformatics
Fall 2019
Mondays 5:35 – 9:25 PM

Instructor: Jochen Albrecht
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Class room: HN 1090B-2
Office hours: Mo 3-5 PM and by appointment
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Goal/Rationale:

Building on the contents of GTECH 709, where emphasis is on capturing geographic relationships in basic data structures, this course extends these to 3-D, network and field representations and their respective analysis functions. A focus of this course is the development of geoprocessing workflows. While most techniques have a geographic origin, we will address all geo-spatially relevant methods, including geophysical, landscape ecological, econometric, epidemiological, and regional science approaches. On the practical side, you will be introduced to five different software packages. Each of you will conduct an individual software project that relates to GIS analysis. The choice of software package is up to you. The application area (field) is to be chosen by you and you are responsible for gathering the necessary data.

Learning Outcomes:
At the end of the semester, you should be able to
- perform advanced selection and filtering techniques by space and/or attribute;
- understand the role of spatial relationships in landscape ecological analysis;
- distinguish the effect of data models on the choice of analysis methods;
- engage in spatial database design;
- mimic dynamics inside of GIS;
- distinguish between spatial statistics and spatial analysis;
- handle vague data;
- write simple scripts to automate GIS tasks; and
- develop their own basic spatial decision support system, either stand-alone or as part of a larger application

Textbooks: required: *none*.
Recommended:
- Worboys, M. and M. Duckham 2004. GIS: A Computing Perspective. CRC Press. ISBN 978-0415283755
- O'Sullivan, D. and Unwin, D.J. 2010. Geographic Information Analysis. Hoboken, NJ: Wiley. ISBN 978-0470288573
- de Smith M, Goodchild, M and P Longley 2018. Geospatial Analysis. Leicester: Winchelsea Press. Free access at http://www.spatialanalysisonline.com/ or as Amazon Kindle ebook (no ISBN)
- Geocomputation with R 2019. https://bookdown.org/robinlovelace/geocompr/

Pre-requisite: GTECH 70900, preferably also GTECH 71000

Policies:

Attendance is crucial. Given that the class-learning environment is active learning, meaning that most of the student 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 itself. 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.

Electronic recording devices are allowed during class. All other personal electronics should be turned off before coming into the classroom. This includes cell and smart phones.

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 this is also the place where you upload your assignments to. Your exams and lab assignments will be graded based on what you have uploaded to BlackBoard and this is where you will find your grades and may access course statistics that help you to assess your standing at any given time.

All email messages about this course should include GTECH 732 in the subject line, and be signed with your full name as it appears in CUNYfirst. You are addressing me professionally and I will not answer messages coming from "fun" addresses such as "sweetheart4u" or "slamdunk23".....

Academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) is simply not acceptable. 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. Helping other students on use of the software is encouraged.
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.

Special accommodations for persons with disabilities are provided upon request. Please see the instructor if you feel the need for them. 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

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

Assignments are due one week after they are given in class. It is in your best interests to keep up with the work and 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 form.

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. All changes will/would be announced on BlackBoard, which you are expected to check on a daily basis.

Criteria for evaluation:

Evaluation of academic performance is based on your lab exercises, your software project and your participation according to the following breakdown:

Lab exercises	30%
Midterm exam	15%
Final exam	20%
Project	35%

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.

All labs exercises are designed for a 4-hour period. You are free to work with them at your own leisure either in our computer labs, in your home department, or at your private home. You can use our computer labs at any time outside of the posted instruction times for other courses. It is your responsibility to manage your time to conduct both the labs as well as project work during the hours that the lab room is accessible. Of course, you are free to work at home as much you want – if you can arrange for access to the software that you need.

Each student conducts an individual semester-long software project that involves the GIS analysis of a substantial geographical problem. There are no requirements with respect to what software you use. In a similar vein, the application area (field) is to be chosen by you, who are also responsible for gathering the necessary data. Basically, you can choose whatever topic you want, provided it has to do with *geographical analysis*; the stress is on both words! It is your responsibility to find a suitable project, which will have to be accepted by the instructor. A few ready-made projects are available but experience shows that motivation increases when students take pride in their own project.

I will not accommodate students who are late in their work or do not show up for the final exam. And, unless you produce a medical certificate or letter from the Office of AccessABILITY, I will not give the final grade of IN (incomplete).

Course Calendar:

This class typically meets on Mondays (except when it is a CUNY holiday). Special dates are:

> 09/15, project proposal due
> 10/28, midterm exam
> 10/20, project update report due
> 12/09, project presentation
> 12/15-17, (take-home) final exam

Schedule (*subject to change – check BlackBoard regularly*):

Week #	Date	Topic
1	09/04	Introduction; review of basics of GIS analysis **on a Wednesday!** Creating new information; selection and aggregation
2	09/09	Spatial databases and spatial queries
3	09/16	Customizing GIS databases; sub-types, domains; regionalization
4	09/23	Map Algebra and Spatial Analyst
5	10/07	Shapes, patterns, distance-based analysis;

		Landscape ecological analysis with FragStats
6	10/16	Location-allocation; topology revisited; network analysis **on a Wednesday!**
7	10/21	Spreading and diffusion
8	10/28	Midterm Exam; <u>**then**</u>: Spatial interpolation with 3-D Analyst and GRASS
9	11/04	Spatial interpolation with the Geostatistical Analyst
10	11/11	Advanced overlay analysis and geo-processing using web services
11	11/18	Fuzzy sets, fractals, and image analysis
12	12/25	Scenario building using scripting tools
13	12/02	Spatial decision support with HAZUS and Visionmaker NYC
14	12/09	Presentation of projects
15		Final Exam

It is the student's responsibility to regularly check the course website to become aware of changes to the schedule or other announcements.

Teaching Philosophy & Approach

Hunter College...
This is a place where students come to learn. It's a place where knowledge is developed and hopefully it's a place where students can see and participate in its development. Unlike previous schooling you don't have to be here, so we'll assume that you want to be here and that you are here to actively seek knowledge and skills.

With assumptions that you are (a) here of your own free will and (b) are actively seeking to gain knowledge and skills, there is only one fuzzy area (for some) - how to succeed! It's really quite simple: have fun. If you are enjoying what you are doing, you will succeed; if you are taking subjects or studying in a particular program and not enjoying it, you are unlikely to be successful.

A few words on success and enjoyment. Success is not just measured by your grade (but passing does help!), it is also measured by how you feel about what you are doing. You are the only person who can really judge whether you are successful - have you met your own expectations? Enjoyment does not necessarily mean stress free living (although maybe it is for some!). Taking only subjects that you were told were "easy" doesn't guarantee enjoyment; some of us require a challenge in life! Again, only you are in a position to determine what you find enjoyable.

A final thought on what a university is: this is also a place where faculty comes to learn...

GTECH 732 Advanced GeoInformatics
<u>Students:</u> to be successful you should be taking this subject because you want to take it, not because someone told you that you need to take it and you must be actively seeking knowledge and skills. This subject is a good participation "sport", but it's not a really good spectator event. You need to be proactive, be able to try something new, look at things from a new (spatial) perspective, ask questions, read read read. You need to know when to take a break, get some fresh air, rest your eyes (a Buddhist philosophy is quite useful...). Attend the lectures and practical sessions. When your absence is unavoidable, make sure you catch up on what was missed. Plan your week as best as possible and make the commitment to spend the amount of time needed for you to be successful. Get a study partner or three, if this works for you.

<u>Faculty:</u> to be successful, I need to know that I've "made a difference" to at least some of my students, i.e., they feel successful. I'll provide a coherent subject structure, I'll deliver the best lecture possible on the day, and pointers to resources where possible and my tutors and I will provide sound practical instruction and practice our listening skills so that we can understand what difficulties you may be having, so that we can

resolve them. Furthermore, we are available and approachable; ask questions in lectures, labs and at other times; use our office hours or make appointments to see us. Faculty have shown disappointing prowess at extra-sensory perception, please help us out!
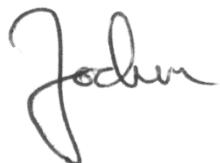
We often lecture in subjects we are considered to have some expertise in; we are therefore fairly interested in the subject matter. We too are students in that we are continuing to learn new things in our areas of expertise and sometimes we are the ones who develop new knowledge in our areas of expertise!

<u>Theory vs. practice:</u> In lectures I try to provide an overview of the most important knowledge, but this never replaces the reading material. Sometimes lectures and readings will cover the same ground, but often, the best that can be done in some fourteen sessions is to provide just a "flavor" of the subject matter, something to whet your appetite, something to set the context for your readings.

Finally...

The reason for this page of amateur pop psychology is twofold: (a) first I hope that prospective students take this subject for the right reasons (i.e. they believe that they will enjoy it) and are in the right frame of mind to be successful and (b) second, I hope that with a little mutual empathy the learning experience can be made better for both student and teacher. If we are not having fun, we are both doing something wrong!

I wish us a lot of fun in this course,