Quantitative Methods in Geography
GTECH 30100/70200
Fall 2022 Syllabus
V1 Aug 1, 2022

Instructor: Allan Frei, afrei@hunter.cuny.edu
Office Hours: by appointment
Course Times: Wednesdays, 11:30AM - 2:20PM
Mode of Instruction: In Person
Room: 1090B-2 Hunter North

Course Overview
The focus of this course is on the application of statistical methods that are common in geographic research. The goal is to understand these techniques so that you can later interpret and use them in an intelligent and appropriate manner; and so that you can learn how to explore related techniques independently. This course is "applied" in the sense that we focus on the application of these techniques more than on the derivation of equations. While we review information from introductory statistics courses, we focus on their application, using examples from physical and social sciences. This course will prepare you for more advanced statistical and spatial analysis topics covered in other courses.

The course has four sections. Each section lasts several weeks, covering one module per week.
1. Getting Started and Modeling Univariate Data
2. Modeling Bivariate Data
3. Modeling Multivariate Data
4. Calibration / Validation (*and principle components analysis (PCA) if there is time*)

Prerequisites
The prerequisite for this course is an introductory statistics course such as STAT 11300 or STAT 21300 at Hunter College (or equivalent with permission of instructor).

Expected Learning Outcomes: After completing this course, you should be able to perform the following:
1. **Explore and model a data set**. Receive a file with data, evaluate its completeness, summarize both univariate and multivariate data in both numerical and graphical format using Exploratory Data Analysis techniques, and identify appropriate models for describing the probability distribution of the data
2. **Develop bivariate statistical models**
3. **Develop multivariate statistical models**
4. **Calibrate and validate models** evaluate model accuracy using calibration and validation methods.

Lectures
The mode of instruction is in-person. Each week covers one module.

Textbook
No text book is required for this course. We will use online resources and additional information provided by the professor through blackboard. Two good online textbooks can be found here: http://www.biostathandbook.com/, Introduction to Statistics - Open Textbook Library (umn.edu), but there are many others you can find.

Software
No experience with any statistical software package is absolutely required, although it is expected that students have familiarity with EXCEL, which we use for a variety of exercises; and with WORD, which we use for submitting assignments. The primary statistical software package to be used is SPSS.

Evaluation

Final grades are based on the following,
each assignment, quiz, and presentation is given equal weight:

- 11-12 homework assignments
- three quizzes
- for grad students their final presentations.

No extra credit assignments are given. All assignments are weighted equally, except for assignment 1 which is considered low impact and weighted less. Each quiz will be weighted the same as one homework assignment. And, for graduate students, the presentation will be given equal weight to one assignment.

Assignments
There is one module for each week, each of which typically has more than one part, and each of which has an associated assignment. ASSIGNMENTS ARE DUE BEFORE THE BEGINNING OF CLASS ON THE DUE DATE, ONE WEEK AFTER THE MATERIAL IS COVERD IN CLASS. LATE ASSIGNMENTS WILL NOT BE ACCEPTED. All assignments must be submitted via blackboard. Some assignments may include different and/or additional work for graduate students. Students are allowed unlimited submissions for all assignments prior to the due date. The most recent submission that falls prior to the due date will be graded. Assignments will be graded within one week after the due date.

Quizzes There are three quizzes during the semester, for sections 1 and 2, and 3.

Graduate Student Presentations
Graduate students are also required to discuss with Prof. Frei near the beginning of the semester their interest in this class, and their presentation to the class at the end of the semester. The presentation is to be about one or more journal articles related to the course material. If a student requests, Prof. Frei will consider allowing a presentation of a statistical analyses related to the student's own research.

To communicate with the professor: All email messages about this course should go to afrei@hunter.cuny.edu, should include "GTECH 301/702" in the subject line, and should be signed with your full name as it appears on blackboard or CUNYFirst. I try to respond promptly, but please do not hesitate to contact me again if I do not respond to your email within two days, or sooner if you need more urgent attention!

The professor will communicate with you: using the email address that Blackboard has. Make sure that you check the email that is listed under blackboard.

Blackboard
Most material provided to students, and material submitted by students, will be through Blackboard. You will access homework assignments, check grades, upload your assignments, and submit your work, through

Blackboard. Other material may be available on line.

Grading Policy
All grading for this course will follow the CUNY grading policy, which can be found: http://catalog.hunter.cuny.edu/content.php?catoid=15&navoid=1433.

Incomplete (IN) Grades
A final grade of IN (incomplete) will be given only under extraordinary and documented circumstances.

Software access
Options for access to SPSS software will be available on blackboard.

Class Environment in-person and on Zoom
To ensure that all class members feel welcomed and equally able to contribute to class discussions, we will all endeavor to be respectful in our language, in our examples, and in the manner in which we conduct our discussions and group work. If you have any concerns about the environment of the class, please contact the professor.

Syllabus Changes
This syllabus and schedule are guides for the course and are subject to change without advance notice. All changes will be announced on Blackboard, by email, and/or in class.

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 Sexual Harassment:
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.

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).

Tentative Schedule (Subject to Change)

All classes are on Wednesdays from 11:30AM to 2:20PM

Week number	Module number	Date	Topics, quizzes, and other dates of interest
1	1	8/31	**Section 1: Modeling Univariate Data (Modules 1-3)** • Introduction to course, syllabus, student options for SPSS software • Module 1: what to do when you get a data file; Exploratory Data Analysis
2	2	9/7	Modeling Univariate Data: CDFs and PDFs
3	3	9/14	Modeling Univariate Data: Tests for Normality, Data Transformation
4	4	9/21	**Section 2: Modeling Bivariate Data (Modules 4-7)** • EDA, Correlation Analysis • Grad students: submit 2-3 possible articles for your final presentation
5	5	9/28	• OLS Regression: Graphical and Numerical Analyses • Review for Quiz 1
		10/5	No class, school is closed
6	6	10/12	• Non-linear OLS Regression (transformations of the independent variable) • QUIZ1 ON SECTION 1, MODULES 1-3
7	7	10/19	• Nonlinear modeling: graphical presentation and curve fitting Review of modules 1-5: critical issues for remainder of the course
8	8	10/26	**Section 3: Modeling Multivariate Data (Modules 8-11)** Intro to MLR and variable selection
9	9	11/2	• Colinearity and dummy variables • Grad students: confirm final presentation article • Review for Quiz 2
10	10	11/9	• residual plots • QUIZ2 ON SECTION 2, MODULES 4-7
11	11	11/16	• Influential data points • Alternative model forms: transformation of dependent variable and heteroscedasticity; bivariate logistic regression • How to write equations
12	12	11/23	**Section 4: Calibration / Validation** Calibration / Validation
13	12	11/30	• Calibration / Validation • Review for Quiz 3
14	*none*	12/7	• Graduate Student Presentations • Graduate Student Presentations
Finals Week	Finals Week	12/15 to 12/21	QUIZ3 ON SECTION 3, MODULES 8-11 Day and time to be determined