STAT 787: Statistical Models for Spatial Data (Fall 2023)

Professor

Peter F. Craigmile, Ph.D.

Email: peter.craigmile@hunter.cuny.edu

Office hours in Hunter East 908: Mon 2.30-3.30pm, Wed 10.30-11.30am, or by appointment.

Learning Outcomes

Students will get exposure to three main areas of spatial modeling dealing with geostatistics, Markov random fields, and point processes. They will learn fundamental concepts and statistical inference for random fields and will work on data analysis projects focused on exploration, visualization, model fitting and diagnostics for spatial and/or spatio-temporal data.

Lectures

Wed 5.30-7.20pm, in Hunter East 920

There is no lecture on Wed Nov 22 (Thanksgiving)

Lectures may not be recorded.

Class Attendance Policy

You are expected to attend all lectures.

Recommended textbook

Bivand, Pebesma, and Gomez-Rubio, Applied Spatial Data Analysis with R (2nd Edition), Springer, 2013. Available for download from http://proxy.wexler.hunter.cuny.edu/login?url=https://link.springer.com/book/10.1007/978-1-4614-7618-4. I will highlight other useful references as the course progresses.

Necessary software

This class requires you to use the statistical software packages called R (The R Project for Statistical Computing; https://www.r-project.org/) and RStudio (https://posit.co/). These software packages are available as Free Software with versions compatible with current macOS and Windows operating systems. More details will be given in lectures.

Grading Policy

Homework	Midterm	Final project
35%	30%	35%

Grades will be recorded on the class website.

Homework will be due at the beginning of class on the day it is due (5.30pm). Typically, no late homework will be accepted. However, if you are unable to complete an assignment on time, please get in touch with me before the homework is due so we can discuss your situation. You are encouraged to work together on the homework, but do not copy any part of a homework. Each student must produce his/her own homework to be handed in. All homework must be submitted online as a PDF file through the class website. Feel free to ask me for help after you have tried the questions.

Midterm: The midterm will be held in class on Wed Oct 25. The midterm will be closed book/closed notes. There is no make-up exam. A basic calculator is allowed – tablets, laptops, cellphones, and other communication devices are not. The midterm covers the material up to and including Wed Oct 18. Further details will be given in advance of the exam.

Final project: You will be responsible for producing a presentation and project report on a spatial statistical data analysis. The report will be due by 5.30pm on Wed Dec 20 (during finals week). Further details, including a list of possible topics, will be given after the midterm.

Tentative schedule

Week	Date	Topic
1	Wed Aug 30	Introduction to spatial statistics, Geostatistics 1
2	Wed Sep 6	Geostatistics 2
3	Wed Sep 13	Geostatistics 3
4	Wed Sep 20	Geostatistics 4
5	Wed Sep 27	Geostatistics 5
6	Wed Oct 4	Geostatistics 6
7	Wed Oct 11	Areal processes 1
8	Wed Oct 18	Areal processes 2
9	Wed Oct 25	Midterm
10	Wed Nov 1	Areal processes 3
11	Wed Nov 8	Areal processes 4
12	Wed Nov 15	Point processes 1
13	Wed Nov 22	**No lecture (Thanksgiving)**
14	Wed Nov 29	Point processes 2
15	Wed Dec 6	Project presentations

The final project report is due at 5.30pm, Wed Dec 20

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."

American Disability Act (ADA) Policy

"In compliance with the American Disability Act of 1990 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: https://www.cuny.edu/about/administration/offices/legal-affairs/policies-resources/reporting-of-alleged-miscounduct/"

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. Official announcements will always be those made in class or on the class website.