Syllabus for **STAT 8025 (#)** Spatial Statistics. Spring 2025

Wednesdays/Fridays, 9:30 pm – 10:50 pm, 60WCHARL 245

Instructor: Bledar Alex Konomi
Department of Mathematical Sciences, French Hall West 5316
Phone (513) 556-4050 (6-4050 from on campus phones)

Office Hours: Wednesday 1:30 pm – 2:30 pm or by appointment, 5316 French Hall

Course Description: This course is concerned with Spatial Statistics. The course will cover : Reginalised statistical concepts, Point referenced data analysis, Aerial unit data analysis, Point pattern data analysis, Spatio-temporal processes, etc..

Objective: This course will introduce students to the Spatial Statistics research. At the beginning students will learn the basic concepts and then we will move on research papers and explanation. The course will emphasize modeling and computations under the Bayesian paradigm. We will use R when necessary to explain concepts (may also introduce Matlab tools).

Prerequisites: Students are assumed to have background knowledge of concepts of probability, mathematical statistics, applied statistics and advance calculus. Bayesian statistics background is preferable.

Textbook: The following books are going to be useful tools for review:

Cressie, N. (2015). "Statistics for spatial data". John Wiley & Sons.

Kent, J. T., & Mardia, K. V. (2022). "Spatial analysis" (Vol. 72). John Wiley & Sons.

Gaetan, C., & Guyon, X. (2010). "Spatial statistics and modeling" (Vol. 90). New York: Springer.

Moller, J., & Waagepetersen, R. P. (2003). "Statistical inference and simulation for spatial point processes". CRC press.

Banerjee, S., Carlin, B. P., & Gelfand, A. E. (2014). "Hierarchical modeling and analysis for spatial data". CRC press.

Ripley, B. D. (2005). "Spatial statistics". John Wiley & Sons.

Wackernagel, H. (2003). "Multivariate geostatistics: an introduction with applications." Springer Science & Business Media.

Diggle, P. J. (2013). "Statistical analysis of spatial and spatio-temporal point patterns." CRC press.

Cressie N, Wikle CK (2011) "Statistics for Spatio-Temporal Data." John Wiley & Sons, Hoboken, NJ

Main textbooks software oriented:

Bivand, R. S., Pebesma, E. J., Gomez-Rubio, V., & Pebesma, E. J. (2008). "Applied spatial data analysis with R" (Vol. 747248717, pp. 237-268). New York: Springer.

Moraga, P. (2023). "Spatial statistics for data science: theory and practice with R." CRC Press.

Course Webpage: All course related information are posted on UC canvas, including course syllabus, reading assignments, lecture notes, handouts, homework assignments, codes, announcements, etc. Visit Canvas frequently.

Grade: Your final course grade will be based on the following weighting of assessment components: Your

Table 1: Grade weighting

Attendance-Participation	Homework	Topic Presentation	Project
20%	20%	20%	40%

final course letter grade will be assigned according to the following grading scale: A 93–100, A- 90 – 92, B+ 87–89, B 83–86, B- 80 – 82
C+ 77–79, C 73 – 76, C- 70 – 72, D+ 67– 69, D 63 – 66, D- 60 – 62
F below 60

Homework: This is not going to be a traditional type of homework. However, I am intending to assign tasks for solving problems.

Project: There will be a major individual project for this class which will account for the 40% of your grade. For this you have to submit a proposal, give a class presentation and a final manuscript.
You have to submit one project proposal to me by email and must contain the following information.

1. Your name.
2. Project Title.
3. Project Description - What is the goal of the project, what problem are you solving or what experiment will you be performing, and what do you hope to accomplish by the end of the semester?
4. Project Deliverables - What results and analysis will you have by the time of the presentation of your project to the class?
5. Work Plan - What work needs to be done to accomplish your objectives?
6. Datasets - What dataset will you be using? Do you already have experience in using it? How large is it?

A project presentation will be required at the end of the semester. Please include project goal, what you were trying to accomplish, technical approach, what method you were using to achieve your goal and the outcome and results, what were the results of your efforts.
A final report in the form of a paper should be also submitted by the last day of class. The code used should be also included in a separate file.

Communication Devices Personal communication devices such as cell phones and PDAs must be either turned off or put on vibrate during class. Additionally, please refrain from texting during class.

Academic Integrity Please help maintain an academic environment of mutual respect and fair treatment. You are expected to produce original and independent work on the exams. For homework, group work is encouraged. However, it is plagiarism to copy someone else's work and call it your own. All students must submit their own written work in their own words. Academic misconduct will not be tolerated (http://www.uc.edu/conduct/Academic_Integrity.html).

Issues of Differing Abilities: Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of those available accommodations, students must contact the Disability Services Office at 210 University Pavilion (513-556-6823).
http://www.uc.edu/aess/disability.html.
(This syllabus is subject to changes.)