Syllabus for ST433/ST533
Applied Spatial Statistics, Fall 2020

Course:

      Meeting times: W 1:30–2:45
      Course website: https://st533.wordpress.ncsu.edu/

Instructor: Brian Reich

      Email: brian_reich@ncsu.edu
      Office Hours: M 1:30–3:30 and by appointment

Teaching Assistant: Sukanya Bhattacharyya

      Email: sbhatt22@ncsu.edu
      Office Hours: Tu 1-2

Prerequisites for ST433: ST 422 and ST 430.

Prerequisites for ST533: ST 512 or ST 514 or ST 515 or ST 517.

Textbook: *Applied Spatial Data Analysis with R, Second Edition* by Bivand, Pebesma, Gmez-Rubio

Lectures: Lectures will be prerecorded and links will be available on the course moodle page. Lectures can be viewed anytime during the week. Students will be expected to attend one live lab session per week (W from 1:30-2:45) via zoom. The zoom like will be provided on moodle.

Computing: The primary computing language will be R, which is freely available at `http://www.r-project.org/`.

Grading: Final grade will be based on:

$$\text{Final Semester Score} = (5CP + 15H + 25M1 + 25M2 + 30F)/100,$$

where CP is class participation, H is the homework average, $M1$ and $M2$ is the midterms and F is the final exam (all out of 100).

Class participation: Students will actively participate in live labs and send a discussion/clarification question to the instructor before each lab session.

Homework: There will be roughly biweekly homework assignments. Problems and due dates will be posted on the course webpage. Students are encouraged to work in groups. Unexcused late homework will not be accepted, but the lowest score of the semester may be dropped.

Mid-term exams: The midterms will be take-home data analyses or in-class presentations.

Final project: The final is a group research project.

The final exam grade can replace a university-excused missing exam grade. Unexcused missing exams, or inadequate notice of missing an exam will result in a grade of 0 for the exam.

Course outline:

Date	Topic	Date	Topic
8/10	Introduction	9/28	Geostatistics - big data
8/17	Geostatistics - models	10/5	Spatiotemporal and multivariate data
8/24	Geostatistics - estimation	10/12	Areal data - models
8/31	Geostatistics - estimation	10/19	Areal data - estimation
9/7	Geostatistics - prediction	10/26	Point pattern data - models
9/14	Bayesian Geostatistics	11/2	Point pattern data - estimation
9/21	Geostatistics - non-Gaussian	11/9	Disease modeling

Course objectives:

1. Map spatial data and test for spatial correlation.
2. Identify a reasonable model for spatial data.
3. Use variograms and maximum likelihood analysis to fit spatial models.
4. Compare models using cross-validation and goodness-of-fit diagnostics.

Policy on Academic Integrity: The University policy on academic integrity is spelled out in Appendix L of the NCSU Code of Student Conduct. For a more details see the NCSU Office of Student Conduct website `http://www.ncsu.edu/student_conduct/`. For this course group work on homework is encouraged. However copying someone else's work and calling them your own is plagiarism, so the work you turn in should be your own.

Students with Disabilities: Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students (DSS), 1900 Student Health Center, CB 7509, 515-7653.