Math 12230: Spatio-Temporal Statistics for Big Data
Fall 2015

Lectures: Wednesdays 3:10–5:50 pm, 307 Classroom Building 1

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Office hours: Thursdays 10:00 am–12:00 noon, 2nd Floor, Xiaolou 39, Yandongyuan

Description:
This is a graduate-level topic course in spatio-temporal statistics, emphasizing big data techniques for the analysis of large spatial and spatio-temporal data sets. Topics covered in the course will include geostatistical models and spatial prediction (3 weeks), lattice models and spatial econometrics (2 weeks), spatial point patterns (2 weeks), spatio-temporal processes (2 weeks), computational and statistical tradeoffs (1 week), divide-and-conquer strategies (1 week), online algorithms (1 week), applications of big data techniques to spatio-temporal analysis (1 week), software for spatio-temporal statistics and big data (1 week).

References:

1. N. A. C. Cressie, *Statistics for Spatial Data* (revised ed.), Wiley, 1993
2. N. Cressie and C. K. Wikle, *Statistics for Spatio-Temporal Data*, Wiley, 2011
3. A. E. Gelfand, P. J. Diggle, M. Fuentes and P. Guttorp, *Handbook of Spatial Statistics*, CRC Press, 2010
4. M. Sherman, *Spatial Statistics and Spatio-Temporal Data: Covariance Functions and Directional Properties*, Wiley, 2011
5. P. J. Diggle, *Statistical Analysis of Spatial and Spatio-Temporal Point Patterns* (3rd ed.), CRC Press, 2014
6. M. L. Stein, *Interpolation of Spatial Data: Some Theory for Kriging*, Springer, 1999

Websites:
Weekly topics and references will be posted at http://www.math.pku.edu.cn/teachers/linw/12230f15.html (public access) and http://course.pku.edu.cn (restricted access).

Exams and Projects:
There will be two take-home midterm exams to be scheduled in Weeks 8 and 14. Students also need to work in groups of one to three on a final project and present it in the forms of a written report and an oral presentation. You are free to choose any topic relevant to spatio-temporal statistics and big data, especially one motivated by your own research problems.

Grading:
The course grade breaks down to 30% each of the two midterm exams plus 40% final project (25% written report plus 15% oral presentation).