



Course Syllabus: Spatial Statistics - AMCS 313

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	AMCS 313
Course Title	Spatial Statistics
Academic Semester	Spring
Academic Year	2016/2017
Semester Start Date	01/22/2017
Semester End Date	05/18/2017
Class Schedule (Days & Time)	01:00 PM - 02:30 PM Sun Wed

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Marc Georges Genton	Marc.Genton@KAUST.EDU.S A	+966128080244	4114, 1, Al-Khawarizmi (bldg. 1)	2:30-3:30PM on Sunday and Wednesday, or by appointment

Teaching Assistant(s)	
Name	Email

Course Information	
Comprehensive Course Description	<p>Course Outline:</p> <ul style="list-style-type: none"> - Geostatistical data: Random fields; Variograms; Covariances; Stationarity; Non-stationarity; Kriging; Simulations. - Lattice data: Spatial regression; SAR, CAR, QAR, MA models; Geary/Moran indices. - Point patterns: Point processes; K-function; Complete spatial randomness; Homogeneous/inhomogeneous processes; Marked point processes. - Special topics (based on interests of participants): Spatio-temporal modeling; Multivariate random fields; Processes on spheres; Non-Gaussian random fields.
Course Description from Program Guide	<p>This course is an introduction to the concepts and applications of spatial statistics. It covers the following topics. Geostatistical data: Random Fields; Variograms; Covariances; Stationarity; Non-stationarity; Kriging; Simulations. Lattice data: Spatial regression; SAR, CAR, QAR, MA models; Geary/Moran indices. Point patterns: Point processes; K- function; Complete spatial randomness; Homogeneous/inhomogeneous processes; Marked point processes.</p>
Goals and Objectives	<p>By the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> (1) Understand the concepts of spatial statistics. (2) Apply the concepts of spatial statistics to real data sets. (3) Use the software R (or others) to perform spatial analysis of real data sets.
Required Knowledge	AMCS 241, 243, 245; AMCS 307 recommended; or equivalent background with permission from instructor

Reference Texts	Textbook: Cressie, N. and Wikle, C. (2011). <i>Statistics for Spatio-Temporal Data</i> . Wiley. Other books: - Schabenberger, O., and Gotway, C. A. (2005). <i>Statistical Methods for Spatial Data Analysis</i> . Chapman & Hall/CRC. - Banerjee, S., Carlin, B. P., Gelfand, A. (2003). <i>Hierarchical Modeling and Analysis for Spatial Data</i> . Chapman & Hall/CRC. - Chiles, J. P., Delner, P. (1999). <i>Geostatistics. Modeling Spatial Uncertainty</i> . Wiley. - Cressie, N. (1993). <i>Statistics for Spatial Data</i> . Wiley. - Goovaerts, P. (1997). <i>Geostatistics for Natural Resource Evaluation</i> . Oxford University Press. - Stein, M. L. (1999). <i>Interpolation of Spatial Data. Some Theory for Kriging</i> . Springer. - Wackernagel, H. (2003). <i>Multivariate Geostatistics. An Introduction with Applications</i> . Springer. - Waller, L., Gotway, C. A. (2004). <i>Applied Spatial Statistics for Public Health Data</i> . Wiley. - Other references and papers: stsd.kaust.edu.sa
Method of evaluation	50.00% - Course Project(s) 25.00% - Scientific review article presentation 25.00% - Homework /Assignments
Nature of the assignments	- Homework assignments (25%): Homework assignments will be given throughout the semester. Assignments will be collected at the START of class on the date due. Late assignments will not be accepted. - Paper presentations (25%): Each student will present two papers in class. - Project (50%): A project, done individually, will be due near the end of the semester, and presented in class (30 minutes). More details will be given as the semester progresses. Late projects will not be accepted.
Course Policies	See above.
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 01/22/2017 Wed 01/25/2017	Spatial statistics
2	Sun 01/29/2017 Wed 02/01/2017	
3	Sun 02/05/2017 Wed 02/08/2017	
4	Sun 02/12/2017 Wed 02/15/2017	
5	Sun 02/19/2017 Wed 02/22/2017	
6	Sun 02/26/2017 Wed 03/01/2017	
7	Sun 03/05/2017 Wed 03/08/2017	
8	Sun 03/12/2017 Wed 03/15/2017	
9	Sun 03/19/2017 Wed 03/22/2017	
10	Sun 03/26/2017 Wed 03/29/2017	
11	Sun 04/02/2017 Wed 04/05/2017	
12	Sun 04/09/2017 Wed 04/12/2017	
13	Sun 04/16/2017 Wed 04/19/2017	
14	Sun 04/23/2017 Wed 04/26/2017	
15	Sun 04/30/2017 Wed 05/03/2017	
16	Sun 05/07/2017 Wed 05/10/2017	
17	Sun 05/14/2017 Wed 05/17/2017	
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Note

The instructor reserves the right to make changes to this syllabus as necessary.