Graduate Course Description

Spring 2014

Math 595: Mathematical Tools for Compressed Sensing

Instructor: Denka Kutzarova

Time: MWF 2–2:50

Recommended Texts: The course will be mainly based on on-line materials. In addition, the following book is recommended (not required). *The volume of convex bodies and Banach space geometry*, by Gilles Pisier, Cambridge University Press, Cambridge, 1989.

Course Description.

Many signals in real-life applications can be well-approximated by signals which are sparse with respect to an appropriate basis. The meaning of compressed sensing is that sparse vectors can be completely recovered from much fewer measurements if the latter satisfy some reasonable conditions, for example the restricted isometry property (RIP) of the measurement matrix. We shall present probabilistic and explicit constructions of RIP matrices. Random matrices are broadly used as a measurement tool, while explicit constructions are connected to codes.

We shall study results from probability and finite-dimensional Banach spaces which are used in compressed sensing.

Grades. The course grade will depend on brief presentations.