



istanbul matematiksel bilimler merkezi  
istanbul center for mathematical sciences

## PROBABILITY MEETINGS

# TWO LECTURES ON PROBABILISTIC METHODS FOR DATA SCIENCE

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### Abstract

Methods of high-dimensional probability play a central role in applications of statistics, signal processing, theoretical computer science and various other related fields. These two lectures present a sample of particularly useful tools of high dimensional probability focusing on the classical and the matrix Bernstein's inequality.

In the first lecture, we will define and discuss classes of distributions named Sub-Gaussian and Sub-Exponential Distributions. After examining properties of these distributions and the Orlicz norm, the lecture will be concluded with a detailed proof of a high dimensional application of Sub-Gaussian random variables for a dimension reduction problem which is well known as Johnson-Lindenstrauss Lemma.

In the second lecture, we will see matrix analogue of the Bernstein's inequality and discuss the proof to understand how we can make use of concentration inequalities in the matrix domain. The lecture will be complemented with an application of Matrix Bernstein Inequality on Spectral Clustering Algorithm which solves Community Recovery problem.

**Date :** Friday, December 15, 2017

**Time:** 15:00

**Place:** IMBM Seminar Room, Boğaziçi University South Campus