

# Basic models and questions in statistical network analysis

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## Resumo/Abstract:

Extracting information from large graphs has become an important statistical problem since network data is now common in various fields. In this minicourse we will investigate the most natural statistical question for three canonical probabilistic models of networks: (i) community detection in the stochastic block model, (ii) finding the embedding of a random geometric graph, and (iii) finding the original vertex in a preferential attachment tree. Along the way we will cover many interesting topics in probability theory such as Polya urns, large deviation theory, concentration of measure in high dimension, entropic central limit theorems, and more.

### Outline:

Lecture 1: A primer on exact recovery in the general stochastic block model.

Lecture 2: Estimating the dimension of a random geometric graph on a high-dimensional sphere.

Lecture 3: Introduction to entropic central limit theorems and a proof of the fundamental limits of dimension estimation in random geometric graphs.

Lecture 4/5: Confidence sets for the root in uniform and preferential attachment.