

CO 749 Random Graph Theory

Instructor: Jane Gao

This course is an introduction to random graph theory and focuses mostly on properties of the classical Erdős-Rényi graphs.

Topics include

- **Erdős-Rényi graphs:** degree distributions; short cycle distributions; concentration of small subgraph counts; thresholds; branching process; the appearance of a giant component; the threshold for connectedness; the thresholds of the appearance of a perfect matching; and of a Hamilton cycle; the chromatic number; the graph spectral.

Topics may include

- **Random regular graphs:** the pairing model; the short cycle distributions; small subgraph conditioning; the number of perfect matchings and Hamilton cycles; the graph spectral.
- **The differential equation method:** the differential equation method; applications.
- **Other random graph models**

Textbooks and reading material.

- Random graphs, Béla Bollobás, Cambridge university press, 2001.
- Random graphs, Svante Janson, Tomasz Łuczak, and Andrzej Ruciński, Vol. 45. John Wiley & Sons, 2011.
- Models of random regular graphs, Nicholas Wormald, London Mathematical Society Lecture Note Series (1999): 239–298.

Prerequisites.

The students are expected to know basic graph theory and probability theory.