

Course title: Mathematics of complex networks

Teacher: Andrew Uzzell

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Office: Ångström 74104

Time: Tuesdays 13:00-15:00 during Spring Term

Room: Polacksbacken 6143

Course content: Mathematical study of complex networks. Survey of basic graph theory. Metrics and measures of graphs. Introduction to the theory of random graphs. Models of network formation. Percolation on networks. Epidemics and other dynamical systems on networks.

Textbook: M.E.J. Newman, Networks.

Provisional lecture schedule:

1. Examples of networks in real systems (chapters 1-5)
 2. Students present examples of complex networks from their own study.
 - 3-4. Basic graph theory (chapter 6)
 - 5-6. Measures and metrics of graphs (chapter 7)
 7. Large-scale structure of networks (chapter 8)
 - 8-9. Erdős-Rényi random graphs (chapter 12)
 10. Random graphs with general degree distributions (chapter 13)
 - 11-12. Models of network formation (chapter 14)
 - 13-14. Percolation on networks (chapter 16)
 - 15-16. Epidemics and other dynamics (chapter 17)
- Students will be expected to read the associated chapter(s) before the lecture and on some occasions asked to present some of the material at the lecture.

Grading: 50% exercises (due every one to two weeks), 50% final project.

Supplementary material: Diestel, Graph Theory; Bollobás, Random Graphs; Janson, Luczak, and Rucinski, Random Graphs.