

ESAP Engineering Complex Networks

-- Engineering Complex Networks: Syllabus --

Mathematics of networks

- Networks and their representation
- Weighted and directed networks
- The adjacency, Laplacian, and incidence matrices
- Degree, paths, components
- Independent paths, connectivity, and cut sets

Measures and metrics

- Degree centrality, eigenvector centrality, katz centrality, PageRank
- Hubs and authorities, closeness centrality, betweenness centrality
- Transitivity, reciprocity, similarity, assortative mixing

The large-scale structure of networks

- Components
- The small-world effect: Six degrees of separation
- Degree distributions. Power laws and scale-free networks
- Distributions of other centrality measures

Random graphs

- Random graphs
- Models of network formation