

# (Introduction to) Network Analysis 2023/24

| Week | Date     | Lectures  | Labs  | Coursework      |
|------|----------|---|---|-----------------|
| 1    | Feb 19th | Networks motivation, graph theory vs network science, graphology                | Recitation on <i>NetworkX</i> library, <i>Pajek</i> format etc. |                 |
| 2    | Feb 26th | Networkology, network representations & data, Erdos-Renyi model                 | Network representations, basic network algorithms               | Homework #1 out |
| 3    | Mar 4th  | Configuration model, small-world networks & model, scale-free networks          | Advanced network algorithms, random graph models                |                 |
| 4    | Mar 11th | Scale-free networks & preferential attachment models, course projects           | Small-world & scale-free models, graphs vs networks             |                 |
| 5    | Mar 18th | Node position & measures of centrality, link analysis algorithms                | Measures of node centrality, PageRank algorithm                 |                 |
| 6    | Mar 25th | Link importance & measures of bridging, network perspectives, some applications | Link betweenness, node similarity, errors & attacks             | Homework #1 due |
| 7    | Apr 1st  | Community structure, community detection & graph partitioning                   | Community structure & detection, project consultations          | Homework #2 out |
| 8    | Apr 8th  | Node equivalence & blockmodeling, core-periphery structure                      | Blockmodeling & block models, $k$ -core network decomposition   |                 |
| 9    | Apr 15th | /   | /   |                 |
| 10   | Apr 22nd | Node mixing in networks, fragments & frequent subgraphs                         | Node mixing by (not) degree, graphlet degrees                   |                 |
| 11   | Apr      | /   | /   | Homework        |

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|----|----------|---|--|--------------------|
|    | 29th     |   |  | #2 due             |
| 12 | May 6th  | Network sampling & comparison, backbones & (convex) skeletons             | Random-walk sampling, network comparison             |                    |
| 13 | May 13th | Node layout & network visualization, course challenges, some applications | Wiring diagram & block models, project consultations |                    |
| 14 | May 20th | Network inference & link prediction, graph machine learning               | Node embeddings & classification, link prediction    |                    |
| 15 | May 27th | Selected applications & research topics, tentative invited talks          | (Q&A)  | Course project due |