MC558 - Design and Analysis of Algorithms II

Programme:

1. Graphs
- Definition and representation of graphs and digraphs
- Isomorphism
- Neighborhood, cuts and degree
- Paths and cycles
- Subgraphs
- Connected graphs and connected components
- Independent sets, cliques and covers
- Vertex coloring
- Matching
- Edge coloring

2. Graphs algorithms
- representation by lists of adjacency and by matrix adjacency
- depth-first search
- breadth-first search
- topological sorting
- strongly connected components
- minimum spanning tree: greedy algorithms of Prim and Kruskal (use of "union-find" e amortized analysis)
- single-source shortest paths: algorithms of Dijkstra, Bellman-Ford and DAG
- all-pairs shortest paths: algorithms of matrix multiplication and Floyd-Warshall

3. Reduction between problems
- For obtaining upper bounds
- For obtaining lower bounds
- Reductions between problems involving graphs

4. Linear Programming
- Formulation of problems as LPs.