

# MATH 662 Seminar in Algebra: Graph Algorithms

Tentative schedule

Spring 2023

**This tentative schedule might be revised during the semester without notification.**

The purpose of this schedule is to provide information about what topics are expected to be covered.

- Week 1 (Jan 18).  
Basic terminologies  
P and NP
- Week 2 (Jan 23, 25)  
NP-completeness  
BFS, diameter, 2-colorability, DFS
- Week 3 (Jan 30, Feb 1)  
DFS, block structure  
**Feb 1 no class due to severe weather**
- Week 4 (Feb 6, 8)  
Strongly connected components, topological sorting
- Week 5 (Feb 13, 15)  
2-SAT  
Greedy algorithms, minimum weighted spanning trees, matroids  
Shortest paths with nonnegative weights
- Week 6 (Feb 20, 22)  
Shortest paths with general weights  
Maximum flow and minimum cut
- Week 7 (Feb 27, Mar 1)  
Matching of unweighted graphs

- Week 8 (Mar 6, 8)
  - Matching of unweighted graphs
  - Linear programming
  - Matching of weighted graphs
- **Mar 13-17, Spring break**
- Week 9 (Mar 20, 22)
  - Matching of weighted graphs
- Week 10 (Mar 27, 29)
  - Chinese Postman Problem
  - Traveling Salesman Problem
- Week 11 (Apr 3, 5)
  - Metric TSP
  - Gomory-Hu trees
- Week 12 (Apr 10, 12)
  - 2-Disjoint Path Problem
  - Fixed parameter tractability and kernelization
- Week 13 (Apr 17, 19)
  - Fixed parameter tractability
  - Tree-width
  - Dynamic programming
- Week 14 (Apr 24, 26)
  - Meta-theorems
  - Expansion
- Week 15 (May 1)
  - Balanced separators