



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Graph Theory and Algorithms

2021-87R-02

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#### Title

Graph Theory and Algorithms

#### Teacher(s)

Prof. Gianluca della Vedova

Prof. Marco Viviani

#### Language

English

#### Short description

The course is an introduction to Graph Theory, without a specific application in mind.

Lecture plan:

1. Introduction to Graph Theory: What is a graph? Basic concepts. Connectivity (connected components, reachability, biconnected components, spanning trees, bipartite graphs)
2. Walks, Paths, Trials, Cycles (Hamiltonian cycles, Eulerian cycles, TSP)

3. Graph Matching (perfect matching, algorithm on bipartite graphs)
4. Graph Decomposition (Modular decomposition, cographs)
5. Graph Coloring (perfect graphs). Treewidth, pathwidth, Twin-width
6. Graph Compression
7. Graph Embedding and Hyperbolicity
8. Graph Mining (Intro & Graph Indexing)
9. Graph Mining (Graph Summarization & Graph Classification)
10. Graph Partitioning (and Clustering) & Complex Networks (graphs to represent complex systems and networks, small-world)

## **CFU / Hours**

2.5 credits/20 hours

## **Teaching period**

May 2021

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