

## Graph Theory and Its Applications to Problems of Society

**Level:** Master, 1st year (M1)

**Cursus:** Political Engineering and DSMI

**Teaching hours:** 33h

**Teachers :** Richard BARON, Stéphane GONZALEZ, Eric RÉMILA

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**Course's objectives:**

this course presents the mathematical and algorithmic aspects of graph theory and explores modern topics in graph theory and its applications to problems in economics, social network, management, social inequalities, operation research...

**Skills at the end of the course:**

- Model a concrete problem and solve it using graph theory.
- Use the mathematical and algorithmic properties of graphs to design useful tools for decision makers (scheduling, indicators, ranking, centrality index in a social network, network flow, matching...)
- Apply graph theory to solve optimization problems.

**Evaluation:** Final exam, 3 hours

**Prerequisites:** A basic understanding of linear algebra, logical and mathematical reasoning, algorithms formulations are required.

**Bibliography:**

- Théorie des graphes, by Claude Berge (1958)
- Graph, Networks and Algorithms, D. Jungnickel (2004)
- Graph Theory and its applications, J.L. Gros, J. Yellen (2006)
- Graph Theory and its applications to Problems of Society, F.S. Roberts