

IS1310

Graph Theory for Computer Science: Algorithms and Applications

Professor: Wassila Ouerdane

Language of instruction: French – **Number of hours:** 36 – **ECTS:** 3

Prerequisites: IS1210 or equivalent.

Period: S6 Elective 01 February to March IN16DE1, SEP6DE1
S8 Elective 08 February to March IN28IE1, SEP8IE1

Course Objectives

Graphs are fundamental mathematical tools of Operations Research. They allow the modeling of systems that are extremely varied and complex. The aim of this course is, first, to increase the knowledge of graph theory and related algorithm and, second, to treat various problems of graphs for different contexts and domains of application.

On completion of the course, students should be able to

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Course Contents

- basics concepts and notions in graph theory;
- Shortest path problem (definitions, theorems, algorithms, complexity, applications);
- Graph Coloring problem.
- Minimum spanning tree problem;
- Flow networks;
- Introduction to scheduling problems
- Introduction to optimization and linear programming

Course Organization

The concepts of this course are addressed by the practice. A class is a combination of lectures, tutorials and practical exercises (using python language). Two levels are available in this course. A basic level for beginners in this field and exploring the graph theory and implementation with python. An advanced level (expert) for the familiar with the theory but wishing to challenge themselves and to resolve complex problems (provide model and solution by using programming with Python language.)

Teaching Material and Textbooks

Slides (power point)

Resources

Wassila Ouerdane (Assistant professor at the industrial engineering Lab)

Khaled Belahcene (Enseignant chercheur au laboratoire Génie Industriel)

Evaluation

a serie of practical exercises.

An intermediate control of 2hours

A final control of 3 hours at the end of the course.

The final mark is an aggregation of the three evaluations.

Documents and calculator allowed.