UCL
Université catholique de Louvain

LINMA1691
2010-2011

Discrete mathematics - Graph theory and algorithms

5.0 credits	30.0 h + 22.5 h	1q

Teacher(s) :	Blondel Vincent ; Delvenne Jean-Charles (compensates Blondel Vincent) ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	Introduction to the language and theory of graphs : questions of characterization, isomorphism, existence and enumeration. Properties of directed and undirected graphs such as connectivity, planarity, k-colorability and the property of being Eulerian, perfect, etc. Modelling of practical problems : data structures and algorithms for the exploration of graphs. Basic graph algorithms and an analysis of their complexity.
Aims :	Demonstrate the value of graphs as a modelling tool. Develop the basics of graph theory, the characterisation and enumeration of different classes of graphs, the existence and search for optimal subgraphs, the complexity of calculating certain graph parameters. *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Content :	Structure and characterization of graphs - basic concepts - degree, connected components, path, cycle, cut, minor, etc. Classes of graphs and their recognition - perfect, series parallel, planar graphs, acyclic digraphs, etc. Exploration of graphs and tests of their properties - k-connected, eulerian, etc. Flows - theorems of Menger and Hall, maximum flow and minimum cost flow algorithms and their complexity. Problems :finding optimal matchings and stable sets, the travelling salesman problem, cut, graph partitioning and graph colouring problems
Other infos :	Algorithmic Graph Theory, Alan Gibbons, Cambridge University Press 1985 Introduction to Graph Theory, Douglas West, Prentice Hall 1996. Combinatorial Optimization, W.R. Cook et al., Wiley 1998. Network Flows, Ahuja et al., Prentice Hall 1993.
Cycle and year of study :	> Bachelor in Mathematics > Bachelor in Engineering > Bachelor in Computer Science > Master [120] in Computer Science and Engineering > Master [120] in Computer Science > Master [120] in Mathematical Engineering > Master [120] in Electrical Engineering > Master [120] in Electro-mechanical Engineering
Faculty or entity in charge:	MAP