Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
MAT332	Graph Theory	6	5	0	0	3	5

Prerequisites	
Admission Requirements	

Language of Instruction	French
Course Type	Elective
Course Level	Bachelor Degree
Objective	-This course aims to introduce the basic concepts, topics and results of Modern Graph Theory with a target of techniques that are applicable in especially social sciences.
Content	Basic graph theoretical concepts: paths and cycles, connectivity, trees, spanning subgraphs, bipartite graphs, Hamiltonian and Euler cycles. Algorithms for shortest path and spanning trees. Matching theory. Planar graphs. Colouring. Flows in networks, the max-flow min-cut theorem. Erdös-Rényi random graphs. Szemerédi´s regularity lemma. Infinite graphs. Applications in computer science and social sciences.
References	Graph theory, Diestel, Reinhard., 4th ed.: Heidelberg: Springer, 2010. Graph Theory with Applications, Bondy.and Murty, North-Holland, 1979 Graph Based Natural Language Processing and Information Retrieval / Rada Mihalcea, Dragomir Radev, Cambridge University Press, 2011. Discrete Mathematics, An Open Introduction, Oscar Levin, at http://discretetext.oscarlevin.com/ Proof Techniques in Graph Theory, Harary, F. , Academic Press, New York, 1969. New Directions in the Theory of Graphs, Harary, F., Academic Press, New York, 1973.

Theory Topics

Week	Weekly Contents
1	Fundamental Concepts of Graph Theory
2	Paths and cycles
3	Trees
4	Basics of matching theory
5	Algorithms for the shortest path
6	Algorithms for spanning trees
7	Midterm Exam
8	Planar Graphs and Coloring
9	Planar Graphs and Coloring
10	Large Graphs and Clustering

Week	Weekly Contents
11	Large Graphs and Clustering
12	Presentations of projets
13	Applied Graph Theory and Modeling
14	Applied Graph Theory and Modeling