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