

UNIVERSITA' DEGLI STUDI MEDITERRANEA DI REGGIO CALABRIA

Subject Code	16528
Subject Name	Graph theory
Professor	Vittoria Bonanzinga
Department:	DIIES
Degree course:	Computer Engineering and Systems for Telecommunications
Class:	LM27
Type of educational activity:	
Disciplinary Area:	Geometry
Scientific-Disciplinary Sector:	MAT/03
Compulsory preliminary exams:	NO
Course Year:	II
Semester:	II
ECTS:	6
Hours:	48

Synthetic description:

Introduction to the basic concepts and results of graph theory: graphs, walks, paths, cycles, trees, connectivity, planarity, colorings, flows. Algorithms and applications.

Acquisition of knowledge on:

The course also aims to provide the basic knowledge of graph theory: definitions, connectivity, planar graphs, colors, flows. It also aims to provide the tools and techniques of graph theory to the study of concrete problems for the construction of models and the search for solutions to decision problems.

Evaluation method:

Written and oral tests

Student's independent work

For each credit 18 hours of individual study must be undertaken

Detailed course program

Origins: problem of the bridges of Königsberg. Definitions and basic concepts: definitions, cycle, multigraph, complete graph, bipartite graph, paths, circuits, connectivity components, the cutting point. Representation of graphs. Trees and planar graphs. Directed graphs. Matrices and vector spaces of graphs. Eulerian paths and circuits.

Adjacency matrix. Incidence matrix. Matching. Graphs and colorings. Trees with roots. Networks. Walk in the nets. Straight Eulerian. Hamiltonian circuit. Eulerian graph. Hamiltonian graph. Causal graphs. Dirac's theorem. Flows. Ramsey theory. Euler's theorem. Algorithms: the Warshall, Dijkstra, Floyd, Kruskal and Prim, Hungarian, Ford-Fulkerson, Davidson-Harel. Applications of graph theory to transport, power grids, computer networks for the distribution and storage of information.

Resources and main references

1. R. Diestel, "Graph Theory" (pdf, 2.91MB), Springer-Verlag, Electronic Edition, 2005.
- 2 W. D. Wallis, A Beginner's Guide to Graph Theory, Second edition, Birkhäuser, 2007.
3. J. A. Bondy, U.S.R. Murty, Graph Theory, Graduate Texts in Mathematics, Springer 2010.
4. Claude Berge, graphes ET HYPERGRAPHES, Dunod Paris