

Syllabus of
«Elements of operations research»
University Polytechnic of Tirana

Séance n°	Titre	Description	CM	TD	TP
1 (4 hours)	INTRODUCTION : What is Operations research ? Graphs.	Operations Research - history The practical nature of Operational Research: Some operational research issues: Discrete combinatorial problems Continuous combinatorial problems Random problems WHY GRAPHS? : GRAPH THEORY VOCABULARY: CODING OF GRAPHS:	X	X	
2 (4 hours)	Polynomial algorithms for graphs	DEFINITION OF POLYNOMIALITY: Algorithm for minimum cost spanning tree, Other graph algorithms	X	X	
3 (4 hours)	Shortest paths	INTRODUCTION: shortest PATHS: FORD ALGORITHM: DIJKSTRA ALGORITHM: BELLMAN ALGORITHM: MATRICAL METHOD:	X	X	
4 (2 hours)	Scheduling	NTRODUCTION: CONJUNCTIVE GRAPHS, THE POTENTIAL-TASK METHOD: The PERT method	X	X	
5 (6 hours)	Flows in networks	TRANSPORT NETWORK: FLOW CONSERVATION GENERALIZATION LEMMA Algorithm for searching a complete flow: FORD-FULKERSON algorithm: Augmenting path: Ford - Fulkerson theorem: The maximum flow problem <i>ROY Algorithm</i>	X	X	
6 (6 hours)	COMPLEXITE DES PROBLEMES COMBINATOIRES	CLASS NP, POLYNOMIAL AND NP-COMPLET PROBLEMS, DYNAMIC PROGRAMMING tree METHODS The Ladies of Gauss: The "LITTLE" method for the traveling salesman problem:	X	X	
7 (4 hours)	Linear programming : introduction and modelling (I)	Canonical formulation of a LP Modelling techniques real life examples: resource allocation, diet problem, warehouse, flows, etc.	X	X	
8 (4 hours)	Linear programming :		X	X	

	modelling (II)	Modelling for : transportation problems, paths and flows in networks, scheduling, etc.			
9 (4 hours)	Linear programming : modelling (III)	Modelling for : transportation problems, paths and flows in networks, Scheduling, etc.		x	x
10 (8 hours)	Linear programming : modelling (III)	Modelling for : transportation problems, paths and flows in networks, Scheduling, etc.		x	x

Pedagogical activities	hours
lectures	24
exercices	16
labs	8
Estimated personal work	72
total	120