DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS

COURSE TITLE	*ENGLISH CODE/NO*	*ARABIC CODE/NO.*	*CREDITS*			
			Th.	*Pr.*	*Tr.*	*Total*
Network Analysis	**IE 413**	هـ ص ٤١٣	3	1	-	3
Pre-requisites:	IE 311, IE 331					
Course Role in Curriculum	*Required or Elective:*		Elective			

Catalogue Description:
Introduction to network analysis with industrial applications. Systems modeling and analysis using network techniques. CPM with LP formulation, PERT with LP formulation and cost analysis. Other network algorithms: Minimum spanning tree, shortest path and maximal flow problem. Flowgraph theory. GERT: exclusive OR networks.

***Textbooks*:**
SYSTEMS ANALYSIS AND DESIGN USING NETWORK TECHNIQUES Gary E. Whitehouse, 2nd Ed., 1973, Prentice-Hall, Inc., ISBN 0-13-881474-0)

***References*:**

- **PROJECT MANAGEMENT WITH CPM AND PERT,** Joseph J. Moder and Cecil R. Phillips, 2nd Ed., 1970, Van Nostrand Reinhold Company, ISBN 0-442-15666-9
- **LINEAR PROGRAMMING AND NETWORK FLOWS, 2ND ED.,** Mokhtar S. Bazaraa, John J. Jarvis, and Hanif D. Sherali, 1990, John Wiley & Sons, Inc., ISBN 0-471-63681-9
- World Wide Web (The internet)

***Supplemental Materials*:**

***Course Learning Outcomes*:**
By the completion of the course the student should be able to:

1. Comprehend the fundamentals of network analysis and basic notations.
2. Comprehend network models and representations for project management and generate project schedules.
3. Apply various algorithms for solving network problems.
4. Comprehend network problems and know how to solve those using available techniques.
5. Comprehend the logic of introducing uncertainty into network models**.**
6. Use of computer software in solving network problems**.**
7. Work in teams to solve network problems.
8. Apply network algorithms to a real life problem using various sources such as the internet and investigate various relevant areas of knowledge.
9. Make clear presentations of network problems and solutions.

	Topics to be Covered:	***Duration in Weeks***
1	Introduction: Systems Modeling and Analysis Using Network Techniques, system modeling, types of models to be studied, advantages and disadvantages of network modeling techniques	1
2	Activity Networks: PERT and CPM, arrow diagrams, PERT: Program Evaluation and Review Technique, CPM: Critical Path Method, project control, using Microsoft Office Project, linear programming formulation and using Excel	3
3	Shortest Path Algorithms: Directed acyclic networks, directed cyclic networks, Dijkstra's algorithm, the revised cascade method, some applications, other related algorithms to be obtained from the internet and presented in class such as minimum spanning tree algorithm	3
4	Maximal Flow Analysis: Ford and Fulkerson's labeling procedure, Max-Flow-Min-Cut theorem, the matrix approach, relationship between linear programming and maximal flow problem, other applications	2
5	Flowgraph Analysis: Definition of flowgraph analysis, methods of solution of flowgraphs, topological equivalence, node reduction methods, applications of flowgraphs for system modeling	3
6	Stochastic Networks: GERT – An analytical approach to stochastic networks, Elements of the GERT network, evaluation of Exclusive-OR GERT network, counters and conditional MGF's, applications of Stochastic Networks	3

Student Outcomes addressed by the course: (Put a √ sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	√
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	√
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: ( ) and ( )

Instructor or course coordinator: Dr. Ibrahim Abdulaziz Al-Darrab
Last updated: Jan. 2014