GAU, Faculty of Engineering

Course Unit Title	Operations Reserach I
Course Unit Code	IE307
Type of Course Unit	Compulsory, Industrial Engneering students
Level of Course Unit	3rd Year, Core, Undergraduate(BSc)
National Credits	3
Number of ECTS Credits Allocated	7 ECTS
Theoretical (hour/week)	3
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	3
Semester when the course unit is delivered	5
Mode of Delivery	Face to Face, E-learning activities
Language of Instruction	English
Prerequisities and co-requisities	-
Recommended Optional Programme Components	ENG204 is strongly recommended

Objectives of the Course:

To teach the student the general problem-solving approach by using operations research techniques and to represent him/her the ways how to find optimal solutions for any kind of problems(systems) encountered in manufacturing and service systems.

Learning Outcomes

When this course has been completed the student should be able to		Assesment.
1	➢ Explain the modeling approach of industrial engineering and mathematical models used in OR	1
2	➢ Analyze any production systems and model them to find the optimal	1,2
3	➢ apply sensitivity analysis and duality theory to help decision makers to assess alternatives.	1,2
4	➢ Implement integer programming method to find optimal integer solutions	1,2
5	➢ Explain and use the Network Optimization Techniques for real world projects	1,2
6	➢ Use decision theory to make optimal decisions	
7	➢ Generalise the results obtained as a result of applying operations research optimization techniques.	1,2

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4.Presentation, 5 Lab. Work

Course's Contribution to Program

		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	5
2	Ability to design and conduct experiments as well as to analyze and interpret data	4
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	4
4	Ability to apply systems thinking in problem solving and system design	4
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	1
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	5
7	Ability to express their ideas and findings, in written and oral form	3
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	5
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	4
10	Ability to design systems, processes or products by applying modern methods of work study, ergonomics, production systems and simulation while fulfilling requirements under realistic conditions	3
11	Ability to plan and improve system performance using production planning, quality planning and control, information system design and project planning techniques	4

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5:Very High)

Course Contents

Week		Topics	Exams
1		Overwiev of models, and optimization techniques	
2		Duality Theory And Sensitivity Analysis	
3		The Essence of Duality Theory	
4		Applying Sensitivity Analysis	
5		Integer Programming	
6		A Barnch And Bound Technique	
7		Network Optimization Models	
8		Shortest Path Problem, The Minimum Spanning Tree Problem	
9		Project Management With CPM/PERT	Midterm
10		Scheduling Project with CPM/PERT	
11		Fundamentals Of Decision Theory	
12		Decision Making Under Risk, Decision Making Under Uncertainity	
13		Decision Trees and Utility Theory	Quiz
14		Markov Analyis	
15			
			Final

Recommended Sources

Textbook: Hillier F. S., Lieberman G. J. 'Introduction to Operations Research ', 9e, McGraw-Hill, Inc., 2009
Supplementary Material(s):
Taha H. A., 'Operations Reserach: An Introduction', 8e, Prentice Hall, 2007
Taylor B. W., 'Introduction to Management Science', 10e, Prentice Hall, 2009.
Render B. Et. Al., 'Quantitative Analysis for Management', 11e, Prentice Hall, 2011.

Assessment

Attendance & E-learning	10%	
Assignment (Written)	10%	
Midterm Exam (Written)	25%	
Quiz (Written)	15%	
Final Exam (Written)	40%	
Total	100%	

ECTS Allocated Based on the Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including the Exam week)	15	3	45
Labs and Tutorials	2	2	4
Assignments	8	2	16
Project/Presentation/Report Writing	-	-	-
E-learning Activities	5	2	10
Quizzes	1	10	10
Midterm Examination	1	15	15
Final Examination	1	15	15
Self Study	14	6	84
Total Workload			199
Total Workload/30 (h)			6.63
ECTS Credit of the Course			7