GAU, Faculty of Engineering

Course Unit Title	Operations Reserach II
Course Unit Code	IE308
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	6
Mode of Delivery	Face to Face, E-learning activities
Language of Instruction	English
Prerequisities and co-requisities	IE307
Recommended Optional Programme Components	-

Objectives of the Course:

To teach the student the modelling language to formulate and manage models of the large size commonly encountered in practice in order to analyze and improve the performance of systems.

When this course has been completed the student should be able to		Assesment.
1	➢ Examine the models, systems and optimization problems encountered in practice.	1
2	➢ Recognise the queueing and dynamic programming problems in service and manufacturing systems.	1,2
3	➢ Use several queueing models in order to find better solutions for queueing systems.	1,2
4	➢ Apply dynamic programming technique to find optimal solutions for real-world systems.	1,2
5	➢ Develop a basic simulation model for current systems	1,2
6	➢ 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	4
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		Introduction to Queueing Theory	
2		Basic Structure of Queueing Models	
3		Examples of Real Queueing Systems	
4		The Application of Queueing Theory	
5		M/M/s/1 Queueing Model	
6		M/M/s Multiple Server Queueing Model	
7		M/M/s/N Finite Population Model	
8		M/M/s/K Finite Queue Model	Midterm
9		M/M/s/ Constant Service Time Queueing Model	
10		Introduction to Dynamic Programming	
11		Deterministic Dynamic Programming	
12		Probabilistic Dynamic Programming	Quiz
13		Introduction to Simulation Formulating and Implementing a Simulation Model	
14		Applications of Simulation	
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