GAU, Faculty of Engineering

Course Unit Title	System Simulation
Course Unit Code	IE410
Type of Course Unit	Departmental Elective, Industrial engineering students
Level of Course Unit	4rd Year, Undergraduate(BSc)
National Credits	3
Number of ECTS Credits Allocated	5 ECTS
Theoretical (hour/week)	3
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	4
Semester when the course unit is delivered	7
Mode of Delivery	Face to Face, Project, E-learning activities
Language of Instruction	English
Prerequisities and co-requisities	-
Recommended Optional Programme Components	Good knowledge of probability is recommended

Objectives of the Course:

To teach the student the logic of system simulation approach and to enable him/her to apply the principlesand techniques of simulation in order to model real world systems and hypothetical future systems to find solutions for the problems encountered in manufacturing and service companies.

Learning Outcomes

When this course has been completed the student should be able to		Assesment.
1	Demonstrate an understanding of system simulation methodology and its applications	1
2	Gain awareness for the importance of system simulation while solving real world problems	1,2
3	Create a smimulation model for various systems	1,2,3
4	Use Random Number generators for simulation problems	1,2
5	Use Invers transform method for generating random varietes	1,2
6	Apply system simulation techniques for a broad range of problems in companies	1,2,3

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	2
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	3
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	3
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	5
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 Simulation	
2		Advantages and Disadvantages of Simulation	
3		The Simulation Process	
4		System Definition and Model Formulation	
5		Simulation Models And Application Examples	
6		Statistical Concepts in Simulation Modelling	
7		Random Number Generation	
8			Midterm
9		Discrete Probability Distributions	
10		Continuous Probability Distributions	
11		Queuing System Simulation	
12		Simulation Model for M/M/1 (Single server one queue)	Quiz
13		Job Shop Simulation	
14		Simulation Model for Job Shop Production	
15			Final

Recommended Sources

Textbook: Banks J, Carson II, J.S, Nelson B.L., Nicol, D.M., "Discrete-Event System Simulaton", 5, Perason Prentice Hall, 2009

Supplementary Material(s): Dagpunar, J.S. "Simulation and Monte Carlo with Applications in Finance and MCMC", Wiley, 2007.
Law, A.M. "Simulation Modeling and Analysis", 4th Edition. McGraw-Hill, 2007.

Assessment

Attendance & E-learning	10%	
Assignment	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	7	2	14
Project/Presentation/Report Writing	-	-	-
E-learning Activities	10	1	10
Quizzes	1	6	6
Midterm Examination	1	12	12
Final Examination	1	12	12
Self Study	14	3	42
Total Workload			145
Total Workload/30 (h)			4.8
ECTS Credit of the Course			5