Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
IND304	Modeling and Simulation	6	3	0	0	3	5

Prerequisites	IND373+IND314
Admission Requirements	IND373+IND314

Language of Instruction	Turkish
Course Type	Compulsory
Course Level	Bachelor Degree
Objective	Modeling and simulation are privileged tools for improving the performance of industrial systems. With the theoretical and practical knowledge gained in this compulsory course, students can effectively apply modeling and simulation as decision-making tools in industrial problems (especially problems based on complex systems). In this context, the objectives of the course are determined as follows: - To provide students with basic knowledge about modeling and simulation and how modeling and simulation can be used in decision-making - To provide students with an overview of how businesses can apply modeling and simulation approaches to industrial problems (especially those based on complex systems) - To enable students to learn simulation tools on a computer
Content	Week 1: Introduction to the course: System, model, simulation - Learning to live with randomness and uncertainty - Computers and simulation Week 2: System, input, output, and state concepts - Classification of systems - System approach and analysis - Brief review of production and service systems and their problems Week 3: Basic modeling concepts - Modeling process - Modeling methods - Features and benefits of simulation - Queuing and waiting concepts Week 4: Introduction of Anylogic software Week 5: Monte Carlo simulation - Generation of random numbers - Simulation process - Simulation techniques Week 6: Probability concepts in simulation - Modeling data Week 7: Analyzing real problems with manual simulation Week 8 Midterm Exam Week 9: Designing a simulation project - Structuring an actual simulation project Week 10 Chi-square test - Kolmogorov Smirnov test Week 11: Analyzing real problems with manual simulation Week 12: Checking, validating, and analyzing simulation results Week 13: Examination and application of simulation case studies Week 14 Project presentations
References	1. Kelton, W.D., Law, A.M., “Simulation Modeling and Analysis”, McGraw Hill, 2007. 2. Erkut, H., “Yönetimde Simülasyon Yaklaşımı”, İrfan Yayıncılık, İstanbul, 2000. Anylogic software for simulation: https://www.anylogic.com/use-of-simulation/

Theory Topics

Week	Weekly Contents
1	Introduction to the course: System, model, simulation - Learning to live with randomness and uncertainty - Computers and simulation
2	System, input, output and state concepts - Classification of systems - System approach and analysis - Brief review of production and service systems and their problems
3	Basic modeling concepts - Modeling process - Modeling methods - Features and benefits of simulation - Queuing and waiting concepts
4	Introduction of Anylogic software
5	Monte Carlo simulation - Generation of random numbers - Simulation process - Simulation techniques
6	Probability concepts in simulation - Modeling data
7	Analyzing real problems with manual simulation

Week	Weekly Contents
8	Midterm Exam
9	Designing a simulation project - Structuring a real simulation project
10	Chi-square test - Kolmogorov Smirnov test
11	Analyzing real problems with manual simulation
12	Checking, validating and analyzing simulation results
13	Examination and application of simulation case studies
14	Project presentations