DEPARTMENT of INDUSTRIAL ENGINEERING
COURSE CATALOGUE FORM

Course Code: INDE3103				**Course Title**: System Simulation			
Semester	**L + R + L**	**Credits**	**AKTS**	**Language**	**Category**	**Instructional Methods**	**Prerequisites**
5	3+1+0	3	6	English	Required	Lecture + PS	INDE2156
Course Objectives			To gain knowledge about basic theories and applications related to discrete-event simulation.				
Course Content			Basic principles and analysis of discrete-event simulation. Comparison of event-based simulation and process-based simulation approaches. Methods of generating numbers with a given statistical distribution; inverse transformation and other techniques. Input data analysis and goodness of fit tests. Specific software developed for simulation applications, output analysis and model validation in these software (ARENA).				
Course Learning Outcomes			Upon successful completion of the course, the student is able to: 1. Define the principles of simulation terminology, model development processes and problem analysis. [2] 2. Define the probabilistic and statistical principles of a working system. [1] 3. Use pseudo-random number generation techniques, statistical randomness and independence tests. [2] 4. Implement statistical data fit using input modeling. [5] 5.Model a real life problem (team work) using ARENA software. [2] 6. Solve a real life problem (team work) using ARENA software; present the results in oral and written form (in English). [5] 7. Defend the results of a real life problem in oral and written form (in English). [7] [*Note: Numbers in brackets are indicating the related program outcomes*]				
ISCED Category of the course			52 Engineering				
Textbook			Discrete-Event System Simulation (5th edition); Banks, Carson, Nelson, and Nicol; Prentice Hall, 2010				
Supplementary Material			“Simulation with Arena”; Kelton, Sadowski, Swets; McGraw-Hill				

COURSE PLAN

Week	Topics	Laboratory / Tutorial Work
1	Introduction to Simulation	Examples with ARENA software
2	Introduction to Simulation	Examples with ARENA software
3	Simple Examples of Simulation Models	Examples with ARENA software
4	Concepts in Discrete-Event Simulation	Examples with ARENA software
5	Concepts in Discrete-Event Simulation	Examples with ARENA software
6	Simulation with Arena: Basic Modules, Plots, Runs, Transient vs Steady State	Examples with ARENA software
7	Simulation with Arena: Event scheduling based simulation	Examples with ARENA software
8	Simulation with Arena: Discrete and continuous probability distributions	Examples with ARENA software
9	Random Numbers and Random Variables	Examples with ARENA software
10	Random Numbers and Random Variables	Examples with ARENA software
11	Input Modeling	Examples with ARENA software
12	Input Modeling	Examples with ARENA software
13	Model Verification and Validation Output Analysis	Examples with ARENA software
14	Comparing Alternative System Designs	Examples with ARENA software

COURSE ASSESSMENT SYSTEM

	Activities	Contribution (%)
Semester Activities	**Semester Written Exams**	30
	Homework	5
	Reports	
	Labs	
	Seminars	
	Presentations	
	Term Project	25

	Other (attendance, field trip etc.)	5
FINAL EXAM		35
Total		100

CONTRIBUTION of the COURSE on INDUSTRIAL ENGINEERING PROGRAM OUTCOMES

	Program Outcomes	Low	High
1	Adequate knowledge in mathematics, science and subjects pertaining to Industrial Engineering; ability to use theoretical andapplied knowledgein these areas in complex engineering problems.	**X**	
2	Ability to identify, formulate, and solve complex Industrial Engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.		**X**
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.		
4	Ability to devise, select, and use modern techniques and tools needed for analyzing and solving problems encountered in engineeringpractice; ability to employ information technologies effectively.		
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions.		**X**
6	Ability to work efficiently individually and in intra-disciplinary / multi-disciplinary teams.		
7	Knowledge of Turkish and English languages; ability to communicate effectively orally, inscriptive and visually by using these languages (via business methods such as reports, presentations and instructions).		**X**
8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.		
9	Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice.		
10	Knowledge about business life practices (management activities such as project, risk, change and qualityetc.); awareness in entrepreneurship, innovation; knowledge about sustainable development.		
11	Knowledge about the global and social effects of engineering practices on health, environment, economics and safety, and contemporary issues ofthe century reflected into the field of engineering; awareness of the legal consequencesof engineering solutions.		

ECTS-WORK LOAD TABLE

COURSE ACTIVITIES	**Quantity**	**Time (hr)**	**Work Load (hr)**
Lectures	14	3	42
Final Exam (Preparation included)	1	12	12
Semester Written Exams (Preparation included)	5	11	55
Out of class study time			
Homework	2	4	8
Reports			
Labs	14	1	14
Seminar			
Presentations			
Term Project	1	19	19
Total Load (hr)			150
ECTS Credits of the course (Total Work Load / 25)			6

Revision/Date	**Coordinator / Prepared By**	**Approved By**
5/02/2020	Seda Baş Güre	Çağlar Aksezer