DOKUZ EYLUL UNIVERSITY

FACULTY OF ENGINEERING OFFICE OF THE DEAN

COURSE / MODULE / BLOCK DETAILS

ACADEMIC YEAR / SEMESTER

Offered by: Endüstri Mühendisliği			
Course Title: MATHEMATICAL MODELING AND APPLICATIONS			Course Org. Title: MATHEMATICAL MODELING AND APPLICATIONS
Course Level: Lisans			Course Code: IND 3907
Language of Instruction: İngilizce			Form Submitting/Renewal Date 21/02/2013
Weekly Course Hours: 3			Course Coordinator: DOÇENT ŞEYDA AYŞE TOPALOĞLU
Theory	Application	Laboratory	National Credit: 3
3	0	0	ECTS Credit: 4

Wire: 0 232 301 72 15 Fax: 0 232 301 72 10 Access: http://www.eng.deu.edu.tr

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ACADEMIC YEAR / SEMESTER

Offered to:	Course Status: Compulsory/Elective
Name of the Department:	
Industrial Engineering	Elective Course

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Instructor/s:
DOÇENT ŞEYDA AYŞE

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Course Objective:
This course illustrates how mathematical modeling is applied to decision making processes in services and manufacturing. The students will be aware of the current problems and issues in industry and the focus will be on the required determistic models for their optimum solutions. The course takes place in a computer lab where programming LINGO is illustrated. The developed models are solved via LINGO and solution reports are analyzed thereafter.

Learning Outcomes:	
1	To know the application areas of mathematical modelling and identify different problems
2	To be able to develop deterministic models
3	To be able to solve the problems using LINGO optimization modeling language
4	To be able to perform sensitivity analysis using LINGO and analyze the effects of changes on the optimum solutions
5	To be able to analyze LINGO solution reports

Learning and Teaching Strategies:
Lecture / Question-Answer / Discussion / Problem Solving

Assessment Methods:

Name	Code	Calculation formula
Vize	VZ	
Ödev	OD	
Final	FN	
Bütünleme Notu	BUT	
BNS	BNS	VZ * 030 + D * 020 + FN * 050
Bütünleme Sonu Başarı Notu	BBN	VZ * 030 + D * 020 + BUT * 050

Further Notes about Assessment Methods:

Assessment Criteria:

Textbook(s)/References/Materials:
1- Optimization Modeling with LINGO, Lindo Systems Inc., 5th Edition, 2003 2- LINGO User's Guide, LINDO Systems Inc, 2004 3- Winston W.L., Operations Research: Applications and Algorithms, 4th edition, Brooks/Cole, CENGAGE Learning, 2004

Course Policies and Rules:

Contact Details for the Instructor:
Assoc. Prof. Dr. Şeyda Topaloğlu, seyda.topaloglu@deu.edu.tr

Office Hours:
Assoc.Prof. Dr. Şeyda Topaloğlu, Afternoons on Monday and Tuesday

Course Outline:

Week	Topics:	Notes:
1	Introduction to Mathematical Modeling	
2	Linear Programming Models, Introduction of LINGO Optimization Package	
3	Analysis of LINGO Solution Reports, Unbounded/Infeasible/Degenerate Solutions, Slack/Surplus Values, Shadow Prices/Reduced Costs	
4	Sensitivity Analysis and LINGO Applications	
5	Sensitivity Analysis and LINGO Applications	
6	Use of Sets in LINGO, Types of Sets, @SUM, @MIN, @MAX, @FOR Set Looping Functions, DATA Inputs	

7	Development of Sample Models According to Set Types (Workforce, Days-On Scheduling, PERT, CPM, Matching, Assignment Problems)
8	@WRAP, @SIZE, @IN, @INDEX, @BOUND, @GIN, @BIN Functions and Explanations with Samples
9	Process Selection Product Mix Problems, Goal Programming Applications
10	Midterm Exam
11	Integer Programming Models (Fixed Charge, Assembly Line Balancing, Simple and Capacitated Facility Layout Problems, etc.)
12	Set Covering, Cutting Stock, Column Generation Models and Their Applications
13	Homework Presentations (Machine Scheduling, Supply Chain Modeling, Vehicle Routing, Timetable Scheduling, etc.)
14	Homework Presentations Continue

ECTS Table			
Course Activities	**Number**	**Duration (hour)**	**Total Work Load (hour)**
In Class Activities			
Lectures	11	3	33
Exams			
Midterm	1	1,5	2
Final	1	2	2
Out Class activities			
Preparations before/after weekly lectures	11	1	11
Preparation for midterm exam	1	15	15
Preparation for final exam	1	20	20
Preparation for homework	1	20	20
Total Work Load (hour)			103
ECTS Credits of the Course= Total Work Load (hour) / 25			4