

# PRODUCTION SYSTEMS

1	Course Title:	PRODUCTION SYSTEMS
2	Course Code:	END5110
3	Type of Course:	Optional
4	Level of Course:	Second Cycle
5	Year of Study:	1
6	Semester:	2
7	ECTS Credits Allocated:	7.50
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	None
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Prof. Dr. ERDAL EMEL
15	Course Lecturers:	
16	Contact information of the Course Coordinator:	erdal@uludag.edu.tr Tel: 0224 294 2080 Endüstri Mühendisliği Bölümü, Mühendislik Mimarlık Fakültesi Uludağ Üniversitesi, Görükle, Bursa
17	Website:	<a href="http://endustri.uludag.edu.tr">http://endustri.uludag.edu.tr</a>
18	Objective of the Course:	This course aims to teach an engineering approach to the design of production systems in terms of flow modeling and its mathematical representation. Lean manufacturing systems in terms of flow modeling and mathematical notation in terms of integer programming models are the main materials of the course. Throughout the course lectures with the purpose of developing students' skills practical assignments and project work of system modeling and optimization will be covered.
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	
	1	Gain the ability to define strategies and basic concepts of production systems
	2	The ability to define the role of production systems within the company's business strategies
	3	Ability to explain the effects operating efficiency of production systems and strategies
	4	To be adequately equipped in designing the most suitable production systems and processes, compatible with business management objectives
	5	The ability of conducting business and time studies based on process analysis
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21	Course Content:	

	Course Content:			
Week	Theoretical	Practice		
1	Production Systems, Lean Thinking (Value, Value Stream, Flow, Pull, Perfection)			
2	Just in Time Production System: Production Planning, Scheduling and Inventory Management (Kanban System), sub-industry relationships (Supply Chain Management)			
3	Just in Time Production System: Production Pre-Times, Times of bench preparation, standardization of operations, bench Layout, Flexible Workforce, Assembly Lines			
4	Midterm 1 Manufacturing Systems Mathematical Modeling and Solution Approaches			
5	Mixed Integer Programming Models: Defining the constraints -1			
6	Mixed Integer Programming Models: Defining the constraints -2			
7	Mixed Integer Programming Solution Algorithms – 1 Modeling with MPL			
8	Mixed Integer Programming Solution Algorithms - 2			
9	Midterm 2 Homework Presentation			
Activites		Number	Duration (hour)	Total Work Load (hour)
11	Theoretical Manufacturing System Design - Mathematical	14	3.00	42.00
Practicals/Labs		0	0.00	0.00
12	Self study and preparation Manufacturing System Design - Mathematical	14	7.00	98.00
Homeworks		2	3.00	6.00
13	Projects Cells Manufacturing System Design - Mathematical	2	38.00	76.00
Field Studies		0	0.00	0.00
14	Midterm Exams Presentation of Homework	2	2.00	4.00
Others		0	0.00	0.00
22	Final Exams Textbooks, References and/or Other Materials:	2	2.00	2.00
Total Work Load				228.00
Total work load/ 30 hr				7.60
ECTS Credit of the Course				7.50
		Production Planning by Mixed Integer Programming, Yves Pochet, Laurence A. Wosley, Springer-Verlag, 2006. Model Building in Mathematical Programming, H. Paul Williams, John Wiley and Sons, 2005. Applied Integer Programming: Modeling and Solution, Der-San Chen, R. G. Batson, Y. Dang, John Wiley and Sons, 2010.		
23	Assesment			
TERM LEARNING ACTIVITIES		NUMBE R	WEIGHT	
Midterm Exam		2	25.00	
Quiz		0	0.00	
Home work-project		2	40.00	
Final Exam		1	35.00	

Total	5	100.00
Contribution of Term (Year) Learning Activities to Success Grade	65.00	
Contribution of Final Exam to Success Grade	35.00	
Total	100.00	
Measurement and Evaluation Techniques Used in the Course		

<b>24</b>	<b>ECTS / WORK LOAD TABLE</b>
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<b>25</b>	<b>CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS</b>															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	0	4	3	0	5	0	0	3	4	0	3	4	5	0	0	0
ÖK2	5	3	0	3	0	0	0	4	0	0	0	4	0	3	0	0
ÖK3	5	3	4	3	0	0	0	0	4	0	0	5	0	0	0	0
ÖK4	5	4	4	3	0	0	0	3	0	0	0	0	3	0	0	0
ÖK5	3	4	0	0	0	0	0	4	5	0	0	0	4	0	0	0
<b>LO: Learning Objectives    PQ: Program Qualifications</b>																
<b>Contribution Level:</b>	<b>1 very low</b>		<b>2 low</b>		<b>3 Medium</b>		<b>4 High</b>		<b>5 Very High</b>							