DYNAMIC PROGRAMMING

1	Course Title:	DYNAMIC PROGRAMMING
2	Course Code:	END6105
3	Type of Course:	Optional
4	Level of Course:	Third Cycle
5	Year of Study:	1
6	Semester:	1
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:	Linear Algebra, Mathematical Programming, Probability, Computer Programming
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Prof. Dr. Fatih ÇAVDUR
15	Course Lecturers:	
16	Contact information of the Course Coordinator:	e-posta: fatihcavdur@uludag.edu.tr, Telefon: + 90 (224) 294 20 77 Adres: Uludağ Üniversitesi, Mühendislik-Mimarlık Fakültesi, Endüstri Mühendisliği Bölümü, Görükle Kampüsü, 16059 Nilüfer, Bursa
17	Website:	
18	Objective of the Course:	Learning basic concepts of deterministic and stochastic dynamic programming.
19	Contribution of the Course to Professional Development:	Being able to develop advanced solution approaches
20	Learning Outcomes:	

	1	Being able to understand the basics of dynamic programming.
	2	Being able to model and solve problems using dynamic programming.
	3	Being able to consider computational efficiency for the implementation of dynamic programming methodologies.
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21	Course Content:	
	Course Content:	
Week	Theoretical	Practice

1	Elementary Path Problems -Dynamic Programming Solution of a Simple Path Problem -Introduction to Dynamic Programming Terminology -Computational Efficiency -Other Path Problems and Dynamic Programming Solutions			
2	Equipment Replacement Problems -Dynamic Programming Solution of Equipment Replacement Problem -Shortest Path Representation of the Problem			
3	Resource Allocation -Dynamic Programming Solution of the Resource Allocation Problem -Numerical Solution of the Problem -Adding More Constraints			
4	Path Problems -Shortest Path Problem -Travelling Salesman Problem			
5	Problems with Linear Dynamics and Quadratic Criteria -Problem Definition -Dynamic Programming Solution			
6	-Gradient Method for Numerical Solution			
7	-A Simple Path Problem -Optimal Stopping Strategy			
8	Stochastic Path Problems -Problems with Delay			
9	Applications			
	-Problems -Dynamic Inventory Systems			
10	Stochastic Problems with Linear Dynamics and Quadratic Criteria -More General Models			
11	Optimization Problems and Learning -Introduction -Bayes' Law -A Shortest Path Problem with Learning			
12	Markov Decision Processes -Optimal Policy -Computational Approaches			
13	Markov Decision Processes (cont.) -Finite Horizon Markov Decision Processes -Infinite Horizon Markov Decision Processes			
14	Student Project Presentations			

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	14	10.00	140.00
Homeworks	1	30.00	30.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	5.00	5.00
Others	0	0.00	0.00
Final Exams	1	8.00	8.00
Total Work Load			225.00
Total work load/ 30 hr			7.50
ECTS Credit of the Course			7.50

22	Textbooks, References and/or Other Materials:	1. Dynamic Programming and Optimal Control; Dimitri P. Bertsekas; 3rd Edition, Athena Scientific 2. Linear Programming and Network Flows, S.M. Bazaraa, J.J. Jarvis and H.D. Sherali; 2nd Edition; Wiley 3. Dynamic Programming; R Bellman , PrincetonUniversity Press 4. Linear Algebra and Its Applications, G. Strang; 3rd Edition, Saunders HBJ

23 Assesment

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm Exam	1	25.00
Quiz	0	0.00
Home work-project	1	25.00
Final Exam	1	50.00
Total	3	100.00
Contribution of Term (Year) Learning Activities to Success Grade	50.00	
Contribution of Final Exam to Success Grade	50.00	
Total	100.00	
Measurement and Evaluation Techniques Used in the Course	Exam and Presenatition	

24 ECTS / WORK LOAD TABLE

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