

# DESIGN AND ANALYSIS OF ALGORITHMS

<b>1</b>	Course Title:	DESIGN AND ANALYSIS OF ALGORITHMS	
<b>2</b>	Course Code:	END5121	
<b>3</b>	Type of Course:	Optional	
<b>4</b>	Level of Course:	Second Cycle	
<b>5</b>	Year of Study:	1	
<b>6</b>	Semester:	1	
<b>7</b>	ECTS Credits Allocated:	7.50	
<b>8</b>	Theoretical (hour/week):	3.00	
<b>9</b>	Practice (hour/week):	0.00	
<b>10</b>	Laboratory (hour/week):	0	
<b>11</b>	Prerequisites:	None	
<b>12</b>	Language:	Turkish	
<b>13</b>	Mode of Delivery:	Face to face	
<b>14</b>	Course Coordinator:	Prof. Dr. ERDAL EMEL	
<b>15</b>	Course Lecturers:		
<b>16</b>	Contact information of the Course Coordinator:	erdal@uludag.edu.tr Tel: 0224 294 2080 Endüstri Mühendisliği Bölümü, Mühendislik Mimarlık Fakültesi Uludağ Üniversitesi, Görükle, Bursa	
<b>17</b>	Website:		
<b>18</b>	Objective of the Course:	Computer programs have an indisputable importance for almost all engineering applications. Programs have their basis from the algorithms. Regardless of the type of problems for different applications, there are always common things in algorithms. In this course, especially for optimization practices, it is aimed for Industrial Engineering students' to gain knowledge and skills on analytical thinking and practice for developing new algorithms.	
<b>19</b>	Contribution of the Course to Professional Development:		
<b>20</b>	Learning Outcomes:		
		1	To gain necessary skills for algorithm design and coding through homework and projects on Visual Basic and Matlab
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<b>21</b>	Course Content:		
		<b>Course Content:</b>	
Week	Theoretical	Practice	

1	Algorithm definition, algorithmic problem solving, problem-types, data types.	
2	The effectiveness of two algorithms: asymptotic representation, recursive and non-recursive Algorithms in mathematical analysis	
3	Brute force, exhaustive research algorithms	
4	Divide and Conquer algorithms: associative sort, quick sort, binary search	
5	Decrease-and-conquer algorithms: insertion sort, Depth-First Search, Breadth-First search, topological sorting.	
6	Simplify and conquer: pre-order, Gauss elimination, balanced search trees, vertical sorting.	
7	Size and duration swaps: string matching, hashing, binary tree structures.	
8	Dynamic programming algorithms: Floyd, back-pack	
9	Greedy algoritms: Prim, Kruskal, Dijkstra	
10	Iterative improvement algorithms: Simplex, Maximum Flow Problem	
11	Algorithm Limits: lower-limit, the decision trees, P, NP, and NP-complete problems.	
12	Algorithmic constraints combat: backtracking	
13	Branch and Bound	
14	Approximation algorithms for NP-hard problems	
22	Textbooks, References and/or Other Materials:	<ul style="list-style-type: none"> <li>• Introduction to the Design and Analysis of Algorithms, Anany V. Levitin, Pearson Higher Education, 2007.</li> <li>• Introduction to Algorithms, T.H. Cormen, C.H. Leiserson, R.L. Rivest, C. Stein, McGrawHill, 2007.</li> </ul>
23	Assesment	
<b>TERM LEARNING ACTIVITIES</b>		<b>NUMBE R</b>
		<b>WEIGHT</b>
Midterm Exam	1	30.00
Quiz	0	0.00
Home work-project	3	40.00
Final Exam	1	30.00
Total	5	100.00
Contribution of Term (Year) Learning Activities to Success Grade		70.00
Contribution of Final Exam to Success Grade		30.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		
24	<b>ECTS / WORK LOAD TABLE</b>	

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	5.00	70.00
Homeworks	2	20.00	40.00
Projects	1	30.00	30.00
Field Studies	0	0.00	0.00
Midterm exams	1	20.00	20.00
Others	0	0.00	0.00
Final Exams	1	20.00	20.00
Total Work Load			222.00
Total work load/ 30 hr			7.40
ECTS Credit of the Course			7.50

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	0	4	3	0	2	0	0	0	0	5	0	3	0	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>				