AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Evolutionary Computation								
Course Code	MTK581		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	8	Workload	200 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The course aims to gain the ability of solving various types optimization problems by using the algorithms based on biological evolution process.								
Course Content	Overview of evolutionary computation, Genetic Algorithms, Evolutionary strategies, Swarm Intelligence, Parameter Selection.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Individual Study, Problem Solving								
Name of Lecturer(s)	Assoc. Prof. Korhan GÜNEL								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	30
Final Examination	1	50
Assignment	1	20

Recommended or Required Reading	
1	Agoston E. Eiben , J.E. Smith, Introduction to Evolutionary Computing, Natural Computing Series, Springer, 2010

Week	Weekly Detailed Course Contents	
1	Theoretical	Overview of evolutionary computation and the required mathematical preliminaries: fitness function, population, individual, parent, selection mechanism, elitism
2	Theoretical	Local Searching Methods
3	Theoretical	Genetic Algorithms: Representation of an individual, population models and mutation
4	Theoretical	Genetic Algorithms: parent and survivor selection
5	Theoretical	Evolutionary strategies
6	Theoretical	Evolutionary algorithms and programming
7	Theoretical	Swarm Intelligence and Particle Swarm Optimization (PSO)
8	Theoretical	Some variants of PSO
9	Intermediate Exam	Midterm Exam
10	Theoretical	Differential Evolution Algorithm
11	Theoretical	Ant Colonies
12	Theoretical	Parameter Selection in Evolutionary Algorithms
13	Theoretical	Constraint handling
14	Theoretical	Hybridization of evolutionary methods, and memetic algorithms
15	Theoretical	Applications of evolutionary computations
16	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	3	3	84
Assignment	1	20	2	22
Midterm Examination	1	40	2	42
Final Examination	1	50	2	52
			Total Workload (Hours)	200
			[Total Workload (Hours) / 25*] = **ECTS**	8
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	Ability to understand the origin of evolutionary computation.
2	Ability to select the best alternative evolutionary computation method in the sense of a given objective function.
3	Ability to use the evolutionary methods for optimization problems.
4	Ability to understand local search strategies
5	Ability to learn mutation approaches

Programme Outcomes *(Mathematics Master)*	
1	To be able to have an adequate theoretical and practical domain knowledge.
2	To be able to comprehend the interdisciplinary interaction associated with Mathematics.
3	To be able to use theoretical and practical domain knowledge gained in the field of Mathematics.
4	To be able to interpret knowledge from different disciplines integrating knowledge in the field of mathematics and produce new information.
5	To be able to define, analyse, model and to solve the problems by scientific methods in Mathematics.
6	To be able to conduct a math related specialistic study independently.
7	To be able to develop new strategic approaches to solve problems occurred in unforeseen and complex math-related applications by taking responsibility.
8	To be able to lead in situations that require solving problems related to the mathematics.
9	To be able to criticize his/her knowledge and skills acquired in the field mathematics.
10	To be able to transfer his/her ideas and suggestions for solutions to problems by supporting quantitative or qualitative data verbally and in writing.
11	To be able to communicate both orally and written in a foreign language.
12	To be able to use computer hardware and information technologies with software required by Mathematics.
13	To be able to contribute to the solution of the social, scientific, cultural and ethical problems related to the Mathematics, and being able to support the development of social, scientific, cultural and ethical values.
14	To be able to develop mathematics-related strategies, policies and operational plans, and to evaluate the results obtained within the framework of quality processes.
15	To be able to use his/her knowledge in the field of mathematics and practical problem-solving skills in interdisciplinary studies.

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5
P1	4	4	5	5	4
P2	4	4	5	4	3
P3	4	4	5	4	3
P4	3	4	5	4	4
P5	3	4	5	4	4
P6	4	4	5	4	4
P7			3	4	3
P9	3	3	3		3
P10		3	5	3	3
P11	3	3	3		
P12				4	4
P14		4	4		
P15	5	5	5	4	3