AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Continuous Global Optimization								
Course Code	MTK649		Couse Level		Third Cycle (Doctorate Degree)				
ECTS Credit	7.5	Workload	188 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The purpose of this course is to introduce and to understand the significance of global optimization in view of heuristics and metaheuristics. The course also aims to gain the ability of researching and improving heuristic approaches in this field.								
Course Content	Overview of global optimization and the required mathematical preliminaries. Swarm intelligence based optimization methods, Physics based optimization algorithms, Bio-inspired computing and Chemistry based computing intelligence.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Individual Study, Problem Solving								
Name of Lecturer(s)									

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

Recommended or Required Reading	
1	Xing, Bo, Gao, Wen-Jing, Innovative Computational Intelligence: A Rough Guide to 134 Clever Algorithms, Intelligent Systems Reference Library Series, Vol. 62, ISBN: 978-3-319-34930-5, Springer International Publishing, 2014.
2	Sivanandam, S.N., Deepa, S. N, Introduction to Genetic Algorithms, ISBN: 978-3-642-09224-4, Springer-Verlag, 2008.
3	Price, Kenneth, Storn, Rainer M., Lampinen, Jouni A., Differential Evolution - A Practical Approach to Global Optimization, Springer-Verlag, 2005.

Week	Weekly Detailed Course Contents	
1	Theoretical	Overview of global optimization and the required mathematical preliminaries, classification of global optimization algorithms
2	Theoretical	Swarm Intelligence and Particle Swarm Optimization (PSO)
3	Theoretical	Some Variants of PSO
4	Theoretical	Imperialist Competitive Algorithm (ICA)
5	Theoretical	Some Variants of ICA (ICAAI, ICACI, GICA, EXPLICA)
6	Theoretical	Physics based Intelligence and Gravitational Search Algorithm (GSA)
7	Theoretical	Some Variants of GSA
8	Theoretical	Bio-inspired computing and Bacterial Foraging Algorithm (BFA)
9	Intermediate Exam	MIDTERM EXAM
10	Theoretical	Genetic Algorithms
11	Theoretical	Differential Evolution Algorithm
12	Theoretical	Chemistry based computing intelligence and Chemical Reaction Optimization Algorithm (CRO)
13	Theoretical	Other heuristic methods, Artificial Bee Colony (ABC), Ant Colony (ACO) etc.
14	Theoretical	Hybridization of global optimization methods
15	Theoretical	Applications of heuristic algorithms
16	Final Exam	FINAL EXAM

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	2	3	70
Assignment	1	24	2	26
Midterm Examination	1	40	2	42

Final Examination	1	48	2	50
			Total Workload (Hours)	188
			[Total Workload (Hours) / 25*] = **ECTS**	7.5
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	Ability to understand the origin of heuristics and meta-heuristic optimization algorithms.
2	Ability to select the best alternative optimization method in the sense of a given objective function.
3	Ability to use the heuristics methods for optimization problems.
4	To be able to gain the skill of interpreting some interrelations among these concepts
5	To be able to use mathematical concepts in solving certain types of problems

Programme Outcomes *(Mathematics Doctorate)*	
1	To be able to develop the current and advanced knowledge of mathematics domain to expertise level by an original idea or research, based on the level of its knowledge at the graduate level, and to be able to reach original definitions that will bring innovation to Mathematics.
2	To be able to comprehend the interdisciplinary interaction associated with Mathematics.
3	To be able to use and evaluate the new knowledge in the field of Mathematics with a systematic approach.
4	To be able to develop an idea, a method, a design or an application that will bring innovation to Mathematics, to use well known ideas, methods, designs or applications on a different research area, or to search, comprehend, design, adapt and apply an original subject matter.
5	To be able to criticize, analyze, synthesize and evaluate new and complex ideas.
6	To be able have high-level skills in research methods related to studies on Mathematics.
7	To be able to expand the frontiers knowledge in the field of Mathematics via generating or interpreting an original study, or publishing at least a scientific paper in national/international refereed journals.
8	To be capable of leadership in the positions that require the analyses of problems related to the field of Mathematics.
9	To be able to defend his/her original ideas among the experts in the discussion of math related issues, and to be able to communicate effectively to show his/her competence in the field of Mathematics.
10	To be able to contribute to the solution of the social, scientific, cultural and ethical problems related to the Mathematics, and to be able to support the development of social, scientific, cultural and ethical values.
11	To be able to have both oral and written communication using a foreign language.

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	4	4	4
P2	4	3	4	4	4
P3	4	3	4	4	4
P4	4	3	4	4	4
P5	3	3	4	4	4
P6	4				