COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Heuristic Search Techniques	**CSE512**	**1,2**	**3**	**3**	**10**

Prerequisites	

Language of Instruction	English
Course Level	Graduate
Course Type	Elective
Course Coordinator	
Instructors	Prof.Dr. Emin Erkan Korkmaz
Assistants	
Goals	The aim of this course is to provide students the knowledege about the basic heuristic search techniques and abilities to apply heuristic search methods on practical problems.
Content	Evolutionary algorithms: genetic algorithms, genetic programming, evolutionary programming, evolutionary strategies, applications of evolutionary algorithms and recent developments in these areas. Hyper-heuristics. Social algorithms (e.g., particle swarm optimization), harmony search, simulated annealing, tabu search and other local search methods.

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Knolwedege about the basic heuristic search methodologies.	3	1,2,3	A,C,D
2) Ability to use knowledge to formulate, and solve practical problems using heuristic search techniques.	2	1,2	A,C,D

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study
Assessment Methods:	A: Testing, B: Experiment, C: Homework, D: Project

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Introduction to Heuristic Search Methodologies	Textbook
2	Introduction to Evolutionary Algorithms	Textbook
3	Evolutionary Programming and Evolutionary Strategies	Textbook
4	Genetic Algorithms	Textbook
5	Schema Teorem and Convergence in Genetic Algoritgms	Textbook
6	Genetic Programming	Textbook
7	Applications of Evolutionary Algorithms	Textbook
8	Hyper-Heuristics	Textbook
9	Social Algorithms (e.g., particle swarm optimization)	Textbook
10	Harmony search	Textbook
11	Simulated Annealing	Textbook
12	Tabu Search	Textbook
13	Project Presentations	
14	Project Presentations	

RECOMMENDED SOURCES	
Textbook	Heuristic Search: Theory and Applications, Stefan Edelkamp and Stefan Schroedl, Morgan Kaufmann; 1 edition (July 15, 2011)
Additional Resources	

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Assignment	4	20
Project	1	80
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		35
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		65
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution					
		1	2	3	4	5	
1	Ability to reach wide and deep knowledge through scientific research in the field of Computer Science and Engineering, evaluate, interpret and apply.				X		
2	Ability to use scientific methods to cover and apply limited or missing knowledge, and to integrate the knowledge of different disciplines.			X			
3	Ability to construct Computer Science and Engineering problems, develop methods to solve the problems and use innovative methods in the solution.			X			
4	Ability to develop new and/or original ideas and algorithm; develop innovative solutions in the design of system, component or process.				X		
5	Ability to have extensive knowledge about current techniques and methods applied in Computer Engineering and their constraints.			X			
6	Ability to design and implement analytical modeling and experimental research, solve and interpret complex situations encountered in the process.				X		
7	Ability to use a foreign language (English) at least at the level of European Language Portfolio B2 in verbal and written communication.			X			
8	Ability to lead in multidisciplinary teams, develop solutions to complex situations and take responsibility.	X					
9	Ability to pass process and the results in Computer Science and Engineering field, in national and international area in or outside of the field, systematically and clearly in written or oral form.	X					
10	Awareness of the social, legal, ethical and moral values, and the ability to conduct research and implementation work within the framework of these values.		X				
11	Awareness of the new and emerging applications in Computer Science and Engineering field, and the ability to examine them and learn if necessary.				X		
12	Ability to describe the social and environmental dimensions of Computer Science and Engineering applications.			X			

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	5	70
Project	1	80	80
Assignment	4	15	60
Final examination	1	3	3
Total Work Load			255
Total Work Load / 25 (h)			10.2
ECTS Credit of the Course			10