COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Parallel Processing	**CSE574**	**1**	**3**	**3**	**10**

Prerequisites	

Language of Instruction	English
Course Level	Graduate Degree
Course Type	Elective
Course Coordinator	
Instructors	Assist.Prof. Esin Onbaşıoğlu
Assistants	
Goals	The aim of this course is to provide an introduction to the parallel computing hardware, and to present the software aspects of parallel systems. The course prepares students to effectively design and implement software for modern parallel computer systems.
Content	Hardware and software aspects of parallel computer architectures, design methodology of parallel software, parallel programming models, parallel algorithms, performance aspects of parallel programs, hands-on experience with modern hardware/software systems.

Learning Outcomes	**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1. Knowledge in programming parallel computer systems	1,3,5	1	A
2. Ability to design a complex software under realistic constraints and conditions; ability to apply modern parallel software design methodologies for this purpose	1,3,5	1,3	A,C
3. Ability to select and use modern techniques and tools to design and develop parallel software on modern computer systems	1,3,5	1,3	A,C

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

COURSE CONTENT

Week	Topics	Study Materials
1	Introduction	
2	Taxonomy of parallel architectures, interconnection networks	
3	Methodological design of parallel software	
4	Parallel programming models (Message-passing)	
5	Parallel programming models (Shared-address-space)	
6	Parallel programming models (Data-parallel)	
7	Heterogeneous parallel programming	
8	MIDTERM EXAM	
9	Performance evaluation of parallel programs (Metrics, granularity, overhead)	
10	Performance evaluation of parallel programs (Scalability, isoefficiency)	
11	Parallel algorithms (Matrix algorithms)	
12	Parallel algorithms (Sort/search algorithms)	
13	Parallel algorithms (Graph algorithms)	
14	Advanced topics in parallel programming	

RECOMMENDED SOURCES	
Textbook	V.P. Kumar, A. Grama, A. Gupta, G. Karypis, "Introduction to Parallel Computing", Benjamin/Cummings Lab material: http://cse.yeditepe.edu.tr/v2/en/academic/course-pages
Additional Resources	B. Wilkinson, M. Allen, "Parallel Programming", Prentice-Hall I. Foster, "Designing and Building Parallel Programs", Addison-Wesley

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**

Mid-terms	1	46
Quizzes		
Assignment	6	54
Term Project		
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						
		0	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.						
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.						
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.						
7	Ability to use a foreign language (English) at least at the level of European Language Portfolio B2 in verbal and written communication.						

8	Ability to lead in multidisciplinary teams, develop solutions to complex situations and take responsibility.						
9	Ability to communicate process and the results in the Computer Science and Engineering field, in national and international platforms in or outside of the field, systematically and clearly in written or oral form.						
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.						
11	Awareness of the new and emerging applications in Computer Science and Engineering field, and the ability to examine them and learn if necessary.						
12	Ability to describe the social and environmental dimensions of Computer Science and Engineering applications.						

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	13	6	78
Mid-terms	1	2	2
Homework	6	20	120
Term Project			
Final examination	1	3	3
Total Work Load			245
Total Work Load / 25 (h)			9,80
ECTS Credit of the Course			10