ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
MATERIALS SCIENCE AND MECHANICAL ENGINEERING PROGRAM
COURSE DESCRIPTION AND SYLLABUS

Course Title	Code	Semester	T+L Hours	Credit	ECTS
PARALLEL ARCHITECTURES	ECE-582	SPRING	3 + 0	3	10

Prerequisite Courses	-

Type	Selective
Language	English
Coordinator	Asst. Prof. Gülay Yalçın
Instructor	Asst. Prof. Gülay Yalçın
Adjunt	none
Aim	The main objective of the course is to build a strong understanding of the fundamentals of the architecture of parallel computers and the tradeoffs made in their design. Parallel computers are now almost everywhere and different types of parallelisms are exploited in the computer hardware. These parallelisms, such as, multi-core architectures, parallel memory systems, vector architectures, dataflow machines, and interconnection networks will be explained in the class.
Learning Outcomes	To give an opportunity to students for 1. An ability to understand the tradeoffs in parallel architectures. 2. An ability to evaluate the benefits/drawbacks of recent parallel architectures. 3. An ability to make a literature survey of very recent studies and to present it in front of an audience with little knowledge. 4. An ability to advance the state of the art parallel architectures. 5. Having the knowledge about state of the art parallel architectures.
Course Content	• Introduction and focus Parallel Computer Architectures • Parallel Programming Models • Multicore Processors • Asymmetric Multicore Processors • Multithreading • Caching in Multithreading • Interconnection Network • Dataflow Architectures • Main Memory Management

WEEKLY TOPICS AND PRELIMINARY STUDY

Week	Topic	Preliminary Study
1	Introduction and Focus of Parallel Computer Architecture	The relevant articles from the literature
2	Parallel Programming Models	The relevant articles from the literature
3	Parallel Programming Models (cont.)	The relevant articles from the literature
4	Multicore Processors	The relevant articles from the literature
5	Multicore Processors (cont.)	The relevant articles from the literature
6	Asymmetric Multicore Processors	The relevant articles from the literature
7	Midterm	The relevant articles from the literature
8	Multithreading	The relevant articles from the literature
9	Multithreading (II)	The relevant articles from the literature
10	Caching in Multicore Systems	The relevant articles from the literature
11	Caching in Multicore Systems (cont.)	The relevant articles from the literature
12	Interconnection Network	The relevant articles from the literature

13	Dataflow Architectures	The relevant articles from the literature
14	Main Memory Management	The relevant articles from the literature
15	Final Exam	The relevant articles from the literature

SOURCES	
Lecture Notes	Lecture slides
Other Sources	**Course Textbook:** "Computer Architecture: A Quantitative Approach" by Hennessy and Patterson, Morgan Kaufmann/Elsevier, 5th Edition **Additional Materials:** • David E. Culler and Jaswinder Pal Singh, with Anoop Gupta. Parallel Computer Architecture: A Hardware/Software Approach. Morgan Kaufmann, • Michael J. Quinn. Parallel Programming in C with MPI and OpenMP. McGraw Hill, 2003 • Research papers from ISCA, MICRO, ASPLOS, PACT, HPCA conferences.

COURSE MATERIALS SHARING	
Documents	Lecture notes, slides
Homeworks	Students will be given 5 homework in the semester
Exams	1 Midterm and 1 Final Exam

EVALUATION SYSTEM		
SEMESTER STUDY	**NUMBER**	**CONTRIBUTION**
Midterm	1	30
Homework	5	20
Quiz	2	10
SUB-TOTAL		60
Contribution of Semester Study		60
Contribution of Final Exam	1	40
TOTAL		100

Course Category	
Sciences and Mathematics	50%
Engineering	50%
Social Sciences	0%

RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS						
No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	The skills of using mathematics, science and engineering information in advanced research					**X**
2	The skills of analyzing, designing and/or implementing an original system that will be able to solve an engineering problem,					**X**
3	The skills of using the required software, hardware and modern measurement equipments in their field of research,				**X**	
4	The skills of planning independent research and implementing in detail,				**X**	
5	The skills of following literature, listening to and making technical presentation, writing a paper in academic level,					**X**
6	The skills of innovative and interrogative thinking and finding original solutions					**X**

*Increasing from 1 to 5.

ECTS / WORK LOAD TABLE			
Activities	Number	Duration (Hours)	Total Work Load

Course Length (includes exam weeks: 16x total course hours)	16	3	48
Out-of-class Study Time (Pre-study, practice)	16	1	16
Internet search, library work, literature search	16	1	16
Homework	5	30	150
Midterm	1	30	30
Final Exam	1	40	40
Total Work Load			300
Total Work Load / 30			300/30
Course ECTS Credit			10