CS311 Computer Organization (Spring 2022)

Course:	CS311 Computer Organization
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Teaching Assistants	Minsu Kim (mskim@casys.kaist.ac.kr) Jungwoo Kim (jwkim@casys.kaist.ac.kr) Guseul Heo (gsheo@casys.kaist.ac.kr) Sanghoon Lee (sanghlee@casys.kaist.ac.kr) Sanghyeon Lee (leesh6796@casys.kaist.ac.kr)
Class Meetings	TTh 14:30-15:45pm * 100% online real-time lectures (Zoom link)
Textbook	**Computer Organization And Design: The Hardware/Software Interface,** David A. Patterson and John L Hennessy 5th edition
Course Objectives	In this course, you will learn how computer systems are organized from hardware logics. This course will teach you to understand 1) how software communicates with hardware systems by machine instructions, 2) how computer systems are designed with the basic building blocks of logic and memory elements, and 3) what techniques microprocessors use to improve the performance. As multiprocessors are widely adopted in computer systems, the course will also address the basic concept of parallel programming and architecture.
Prerequisites	Familiarity with C/C++ in Linux, or you should be able to learn C/C++ programming in Linux within the first two weeks of the semester.
Projects	4 implementation assignments (in C/C++).
Homework Assignments	There will be 4 written homework assignments. Each student must work on the assignments ***individually***.
Evaluation	Homework, project, and attendance: 40% Mid-term and Final : 60%
Late submission policy	• 30% loss of grade for the first late day, and after that, submission will not be accepted.
Academic conduct	• You are encouraged to discuss course material with your classmates. However, collaboration on assignments is prohibited. Academic misconduct will have a heavy penalty. • Possession and/or use of another group's code is strictly prohibited. It is

also the student's responsibility to protect his or her work from unauthorized access.

- We will be using a multitude of sophisticated automated plagiarism checker programs to correlate projects to find copied codes.

Spring 2022 Tentative Schedule

Lec.	Topic
1	Introduction
2	Performance
3	CMOS technology and digital logics
4	Instruction set architecture (ISA) I
5	Instruction set architecture II
6	Processor I: data path
7	Processor II: basic pipelining
8	Processor III: pipeline implementation
9	Processor IV: control hazards
10	Processor V: other issues in processor designs
11	Memory hierarchy
12	Cache I: improving cache performance
13	Cache II: more topics on cache
	Midterm exam week
	Midterm exam week
14	Virtual Memory
15	Instruction level parallelism I: Basics
16	ILP II: superscalar and out-of-order execution
17	ILP III: speculation
18	Parallel programming models
19	Multiprocessor I: overview
20	Multiprocessor II: cache coherence
21	Multi-core architecture
22	GPUs and stream computing I
23	GPUs and stream computing II
24	I/O systems
25	Reserved
	Final exam week
	Final exam week