

# 2119250 COMP ARCH ORG

## Syllabus

Computer evolution and performance; computer structure, function, and interconnection; memory hierarchy; cache memory; virtual memory; storage; input/output; operating system support; process; interrupt; system call; instruction set; processor structure and function; pipelining; super-scalar processors; multi-core computers.

## Aim

Today digital technology permeates every corner of our society. There are three big trends that shape our future. The first one is the coming of Artificial Intelligence. The second one is the rise of Automation. The last one the revolution of technology to transfer money. These advancements rely on the power of computing. This class introduces an overview of modern computer systems.

## Topics

Computer Technology  
Instructions  
Arithmetic  
Processor  
Memory  
Graphic Processing Unit  
Quantum computing

## Assessment

40% in-class work, simple question at break, homework

30% midterm (1:30 hours) around first week of March

30% final (2 hours)

## Lecture

Computer Technology  
Technology  
Performance  
Power  
Instructions  
Arithmetic

Floating-point arithmetic  
Processor  
instruction execution  
datapath  
control unit  
RISC-V simulation with detailed control sequence  
<midterm exam>  
Logic design  
pipeline-intro   pipeline-implementation  
memory technology  
cache memory  
direct-map cache  
measuring cache performance  
Graphic Processing Unit  
Development of Graphics Processing Unit  
General Purpose GPU applications  
Concrete example: GPU simulator (NPU) with assembly programming  
Quantum Computing

## Textbook

Computer Organization and Design: The hardware/software interface (RISC-V edition) 2nd edition, D. Patterson, J. Hennessy, Morgan Kaufman, 2020.