

CSE 470 / EE 470 Computer Architecture II

Credits

5.0 (3 hrs lecture, 2 hours meetings)

Lead Instructor

Luis Ceze

Textbook

Hennessy, Patterson. *Computer Architecture: A Quantitative Approach* (5th Edition, Morgan Kaufmann, 2012)

Course Description

Advanced computer architecture. Performance evaluation and energy efficiency. Instruction set architectures. Instruction-level parallelism. Modern microprocessor micro-architecture. Thread-level parallelism. Cache coherency and memory consistency in shared-memory multiprocessors. Memory hierarchy. GPU architecture. Warehouse-scale computing. Trends in computer design. Prerequisite: CSE351; either CSE 469 or EE 469.

Prerequisites

CSE 351; either CSE 469 or EE 469

CE Major Status

Selected Elective

Course Objectives

Understand how a modern microprocessor works.
Understand how multicores work.
Have a general understanding of GPUs.
Have a general understanding of Warehouse-scale computers.
Appreciate the importance of energy efficiency in computing.

ABET Student Outcome Coverage: This course addresses the following outcomes:

H = high relevance, M = medium relevance, L = low relevance to course.

(1) *An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (H)*

(2) *An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (M)*

(6) *An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (M)*

(7) *An ability to acquire and apply new knowledge as needed, using appropriate learning strategies (L)*

Topics:

Introduction to architecture and metrics (performance and energy)

The ISA

Pipelining

Branch Prediction

Superscalars/Dynamic Scheduling

Multithreading

Memory Hierarchy (caches, prefetching, virtual memory)

Cache Coherence

Memory Consistency

Overview of GPUs and Warehouse-scale computers

Current trends in computer architectures (e.g., specialization).