



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Introduction to Computer Architecture

## CSE 3421

**Credit Hours:**

3.00

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**Course Levels:**

Undergraduate (1000-5000 level)

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**Course Components:**

Lecture

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**Course Description:**

Organization of hardware and software in modern computer systems, including instruction set design, processor control, ALU design, pipelining, multicores and accelerators, and memory subsystem design.

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**Prerequisites and Co-requisites:**

Prereq: 2231, and 2421 or ECE 2560, and 2000 or 2060; and enrollment in CSE, CIS, or ECE majors.

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**Course Goals / Objectives:**

- Be competent with performance tradeoffs in computer architecture, especially as they relate to processor and memory design
  - Be competent with the architectural components of a computer, especially the memory hierarchy and processor
  - Be familiar with the design principles underlying modern instruction sets
  - Be familiar with the RISC/MIPS programming
  - Be exposed to the structure of a processor cache
  - Be exposed to multicores, multiprocessors, clusters/datacenters, and IO subsystems
  - Be exposed to the architectures underlying modern computer systems
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**Course Topics:**

- State of the art in computer architecture, Moore's law, and the power wall
  - Quantifying performance and power tradeoffs
  - Design of instruction set architectures
  - Digital logic and circuit design
  - Architecture and design of memory, such as SRAM and DRAM
  - Design of integer arithmetic logic unit (ALU)
  - Floating point representation and arithmetic
  - Processor design: non-pipelined and pipelined
  - Advanced topics in memory hierarchy, such as cache lines, associativity, and cache coherence
  - Multicores, multiprocessors, interconnects, I/O subsystems, and clusters/data centers
  - Realization of architecture concepts in real systems
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**Designation:**

Elective