

CSE 5421 (Approved): Introduction to Computer Architecture

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.

Prior Course Number: CSE 675.01, CSE 675.02

Transcript Abbreviation: Intr Comput Arch

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Senior, Masters, Doctoral

Course Offerings: Autumn, Spring

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 2.0

Repeatable: No

Time Distribution: 3.0 hr Lec

Expected out-of-class hours per week: 3.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: (CSE 2231 or CSE 321) and (CSE 2421 or CSE 360 or ECE 2560 or ECE 265) and (ECE 2000 or ECE 261)

Exclusions: Not open to students with credit for CSE 3421 or CSE 675.01 or CSE 675.02

Cross-Listings:

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.0901

Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
MS CSE	MS Computer Science and Engineering
PhD CSE	PhD Computer Science and Engineering

Course Goals

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 the design of multicore processors and the tradeoffs presented by different memory technology
Be exposed to the architectural design and implementation of modern computer systems

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
State of the art in computer architecture, Moore's law, and the power wall	1.0							
Quantifying performance and power tradeoffs	2.0							
Design and architecture for reduced instruction set computers	6.0							
Digital logic and circuit design	3.0							
Architecture and design of memory, such as SRAM and DRAM	3.0							
Design of integer arithmetic logic unit (ALU)	3.0							
Floating point representation and arithmetic	3.0							
Processor control and pipelining	9.0							
Advanced topics in memory hierarchy, such as cache lines, associativity, and cache coherence	4.0							
Multicores and multiprocessors with an introduction to accelerators and interconnects	5.0							
Realization of architecture concepts in real systems	3.0							

Grades

Aspect	Percent
Homework	30%
Midterm	30%
Final	40%

Representative Textbooks and Other Course Materials

Title	Author
<i>Computer Organization & Design: The Hardware/Software Interface</i>	D.A. Patterson & J.L. Hennessy

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
**	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
**	j	A knowledge of contemporary issues.

Course Contribution		College Outcome
*	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

* Removed exclusion from General Information as it was already in Exclusions. --rowland

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