

Required Course:	ECE 56500 Computer Architecture
Credit and contact hours:	(3 cr.) Class 3, Lab 0
2020-21 IUPUI Campus Bulletin description:	ECE 56500 Computer Architecture (3 cr.) P: ECE 36500 or Graduate Standing. Class 3. An introduction to problems of designing and analyzing current machine architectures. Major topics include performance and cost analysis, pipeline processing, instruction level parallelism, GPU architecture and programming, memory hierarchy, and multiprocessor architectures.
Prerequisite or corequisite:	P: ECE 36500 or graduate standing.
Prerequisites by topic:	Basic computer architecture, computer programming.
Textbook:	J. Hennessy and D. Patterson, <i>Computer Architecture: A Quantitative Approach</i> , 6th Edition, Morgan Kaufmann, 2012. ISBN: 9780128119051
Recommended References:	None
Coordinator:	John Lee, Associate Professor of Electrical and Computer Engineering
Goals:	To teach senior or graduate engineering students more detailed computer architecture beginning with computer organization and ending with performance analysis.
Outcomes:	Upon successful completion of the course, students should be able to <ol style="list-style-type: none"> 1. Describe the function and analyze the hardware organization of multiprocessor systems as well as single processor systems [1,] 2. Describe the function and analyze the performance of instruction level parallelism in processors [1, 6] 3. Program GPGPU, describe its function, and analyze its performance [1] 4. Analyze the execution of instructions for a pipelined processor. [6] 5. Describe the function and analyze the performance of the various components in the memory hierarchy. [1, 6]
Topics:	<ol style="list-style-type: none"> 1. Instruction set architecture (1 class) 2. Pipelining and its performance (4 classes) 3. Memory Hierarchy (4 classes) 4. GPGPU architecture and operation (5 classes) 5. Branch prediction (1 class) 6. Performance analysis (2 classes) 7. Instructional Level Parallelism-hardware approaches (3 classes) 8. Instructional Level Parallelism-software approaches (1 class) 9. Multiprocessors (3 classes) 10. Exams (2 classes and final exam period)
Computer usage:	Computer programming
Laboratory projects:	None.
ABET category:	Engineering science 50% and engineering design 50%
Prepared by:	John Lee
Date:	2021