

JANUARY 2007

CAEB

Approval Date:

Lectures/week	3 hours	Math	0%
Tutorials/week	0 hours	Basic Science	0%
Labs/week	1.5 hour	Complementary Studies	0%
Weeks/term	12.4	Engineering Science	85%
		Engineering Design	15%

Course description

This course covers important aspects of computer architecture with a unifying approach of computer system performance. Topics include computer evolution, system busses, main memory, cache memory, memory management, CPU structure, CPU pipelining, superscalar processors; reduced instruction set computers, 64-bit processors and parallel processing architectures. Prerequisite: CMPE3221.

Course Content

1.	Computer evolution and performance.	4
2.	System busses.	3
3.	Internal memory: main memory, cache, advanced DRAM.	4
4.	External memory: RAID, optical memory.	2
5.	I/O system: DMA, Firewire and Infiniband.	2
6.	Operating system support: OS overview, scheduling, memory management.	2
7.	CPU structure and function: processor organization, instruction cycle, pipelining.	3
8.	Reduced instruction set computers.	2
9.	Instruction-Level parallelism and superscalar processors, superscalar performance, IA-64 architecture.	4
10.	Parallel processing: Multiple processor organizations, SMP, clusters, NUMA, cache coherence.	3
11.	Control Unit: Control Unit Operation and Microprogrammed Control.	2
12.	Project presentation and review	3
13.	Midterm and final exam	5
	Total hours	39

Labs

1.	The PCI bus architecture	3
2.	Cache simulation. Associativity, unified/separate instruction and data caches.	3
3.	Cache replacement policies.	3
4.	Introduction to timing (e.g. Execution-driving) simulation	3
5.	The need for branch prediction	3
6.	Parallel architecture programming with MPI	3

Course evaluation

Assignments (4)	10%	Labs	15%
Tests (2)	20%	Project	10%
Final	45%		