

WEEK #1: September 9

Course Introduction: computer design fundamentals; principle of quantitative analysis.

WEEK #2: September 14-16

The Hardware-Software Interface: instruction set architectures; the role of compilers. Case study: MIPS.

WEEK #3: September 21-23

Pipelining: review of basic concepts; implementation issues; multi-cycle operations. Case study: MIPS R4000.

WEEK #4: September 28-30

Instruction-Level Parallelism: dynamic scheduling; scoreboard, Tomasulo's algorithm. Case study: IBM 360.

WEEK #5: October 5-7

Memory-Hierarchy Design: review of the basics of caches; cache optimization. Case study: Intel Itanium 2.

WEEK #6: October 12-14

Memory-Hierarchy Design: main memory; virtual memory. Case study: Intel Pentium 4 vs. AMD Opteron.

WEEK #7: October 19-21

Instruction-Level Parallelism: branch prediction and speculation; superscalar and VLIW architectures.

WEEK #8: October 26-28

Thread-Level Parallelism: multithreaded architectures. Case studies: SUN UltraSPARC and Intel Pentium 4.

MIDTERM (tentative date!): WEDNESDAY, OCT 28th (in class). Topics covered: first seven weeks.

WEEK #9: November 2-4 [NO CLASS 11/2: Academic Holiday]

Parallel Architectures: taxonomy; types of parallelism; programming and communication models.

WEEK #10: November 9-11

Parallel Architectures: memory consistency model & cache coherency.

WEEK #11: November 16-18

Multi-Core Architectures: chip multi-processors (CMP) and systems-on-chip (SoC). Case study: Nehalem.

WEEK #12: November 23-25

Multi-Core Architectures: on-chip and off-chip communication. Case Studies: IBM Cell and NVIDIA GPU.

WEEK #13: November 30 - December 2

Multi-Core Architectures: embedded computing. Case Studies: ARM 11, TI OMAP platform and Intel Atom.

WEEK #14: December 7-9

[Final Course Review]

WEEK #15: December 14

Perspective: "Towards Thousand Cores Processors: Opportunities and Challenges."

FINAL EXAM: time & location to be announced