EE/CSE 469 – Computer Design and Organization

Winter 2018

Instructor: Prof. Mark Oskin (mhoskin@uw), Office hours: by appointment (email w/schedule).

T.A.: Eric Mullen (emullen@uw) and Xinyu Sui (suix2@uw)

Text: Patterson, Hennessy, *Computer Organization and Design: The Hardware/Software Interface*, ARM Edition, 2016, Morgan Kaufmann. (First ARM edition).

Recommended: Frank Vahid & Roman Lysecky *Verilog for Digital Design* is also recommended.

Topics Covered: Introduction to computer architecture, algorithms, hardware design for various computer subsystems, CPU control unit design, memory organization, cache design, and virtual memory.

Prerequisites: CSE143, EE271 or CSE369. Strong knowledge of hardware design and Verilog from EE271 or CSE369 is essential.

Assignments: The major goals of the class are to familiarize you with basic structure of microprocessors. As part of this, students will develop a Verilog implementation of a simple RISC microprocessor based upon the ARM instruction set.

Note that the labs **GROW SIGNIFICANTLY** in the amount of time it takes to complete them. The average time to complete the labs is expected to be:

Lab 1: Register File	12 hours
Lab 2: ALU	11 hours
Lab 3: Single-cycle CPU	25 hours
Lab 4: Pipelined CPU	34 hours
Lab 5: Cache Memory	30 hours

Exams: There will be one midterm and one final exam (March 12th, 8:30 AM. EEB0037).

Grade: The grade will be determined by the following approximate weights: homeworks (20%), design project (35%), midterm (20%), final exam (25%).

Outline: The class will have the following approximate schedule. Material may be added or dropped based on class timing and progress.

* Introduction to processor architecture.
* Assembly language programming.
* Computer Arithmetic.
* Performance measures.
* Processor Datapaths & Control.
* Pipelining.
* Memory hierarchy, caches, virtual memory.
* Advanced topics in computer architecture.

Reading Schedule

Week 1: 1.1 - 1.4
Week 2: 2.1 - 2.7, 2.9 - 2.10, 2.14, Green Card
Week 3: 3.1 - 3.3, A.5
Week 4: 1.6 - 1.8
Week 5: 4.1 - 4.4
Week 6: 4.5 - 4.8
Week 7: 5.1 - 5.4, 5.8