EE/CSE 469 – Computer Design and Organization

Autumn 2018

Instructor: Prof. Scott Hauck  (hauck@uw.edu)  EE-307Q
Office hours: by appointment (email w/schedule).


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:

<table>
<thead>
<tr>
<th>Lab</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Register File</td>
</tr>
<tr>
<td>2</td>
<td>ALU</td>
</tr>
<tr>
<td>3</td>
<td>Single-cycle CPU</td>
</tr>
<tr>
<td>4</td>
<td>Pipelined CPU</td>
</tr>
<tr>
<td>5</td>
<td>Cache Memory</td>
</tr>
</tbody>
</table>

Exams: There will be one midterm and one final exam.

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.