University of Central Florida

Department of Electrical Engineering and Computer Science

EEL 4768: Computer Architecture (Spring 2015)

Instructor: Zakhia (Zak) Abichar
Office: Harris bldg. 340
Office Hours: Monday, Wednesday @ 10:15am-12:15pm, Tuesday, Thursday @ 2:00-3:00pm
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TA (Section 1&2): To Be Announced
Email:
Office Hours:

TA (Section 3): To Be Announced
Email:
Office Hours:

Class Time & Location

Section	Day & Time	Location
1 (lecture)	Monday, Wednesday @ 9:00-10:15 am	HEC 119
2 (lecture)	Monday, Wednesday @ 1:30-2:45pm	HEC 119
3 (lecture)	Tuesday, Thursday @ 3:00-4:15 pm	HEC 103

Catalog Description (credits, goals and prerequisites)

(3 credits). Computer systems performance and evaluation, processor datapath and control, microprogrammed architectures, instruction and arithmetic pipelines, cache and virtual memory, and RISC vs. CISC.
Prerequisite: EEL 3801C (Computer Organization) or CDA 3103 (Computer Logic and Organization)

Course Goals

This course explores intermediate topics in computer architecture. We'll start by seeing the various elements in the design of a computer architecture and see some corresponding performance evaluations. Next, we'll see the MIPS architecture and assembly language including the 32-bit and 64-bit versions. Following, we'll see the hardware implementations of the MIPS architecture. We'll see three datapath implementations that range from simple, slow implementations to fast, more complex implementations. The implementations are called: single-cycle, multi-cycle and pipelined. To provide a comparison to the MIPS architecture, we'll see the basics of the Intel x86 architecture, which is used in most laptop and desktop computers. The comparison between MIPS (RISC) and Intel x86 (CISC) is a RISC vs. CISC comparison that highlights the two major approaches to designing CPUs. The next topic is the memory of the computer where we'll see the cache memory and the virtual memory. Finally, we'll explore the topic of parallelism and multi-cores where the computer system uses multiple CPUs and is able to run

programs in parallel. We'll finish off with the topic of instruction-level parallelism where one CPU is able to run multiple instructions simultaneously.

Textbook

- *Textbook #1:* "Computer Architecture, A Quantitative Approach", by John Hennessy and David Patterson, Published by Morgan Kaufmann/Elsevier, Fifth Edition, 2012. ISBN: 978-0-12-383872-8.
- *Textbook #2:* "Computer Organization and Design, The Hardware/Software Interface", by David Patterson and John Hennessy, Published by Morgan Kaufmann/Elsevier, 4th Edition (Revised Printing), 2011. ISBN: 978-0-12-374750-1.

Course Topics

- Instruction set principles
- MIPS architecture and assembly language (32-bit and 64-bit)
- Single-Cycle datapath
- Multi-Cycle datapath
- Pipelined datapath
- Intel x86 architecture (RISC vs. CISC)
- Cache memory
- Virtual memory
- Multiprocessors, multicores and clusters
- Instruction-level parallelism

Exam Dates

The midterms are in Week 6 and Week 12 of the semester. The exam dates are the following:

Section 1 & 2 (MW)	Midterm 1: Wednesday, February 18 Midterm 2: Wednesday, April 1 Final (Section 1): Wednesday, April 29 @ 7:00-9:50am Final (Section 2): Monday, May 4 @ 1:00-3:50pm
Section 3 (TR)	Midterm 1: Thursday, February 19 Midterm 2: Thursday, April 2 Final: Thursday, April 30 @ 1:00-3:50pm

Use of WebCourses

- This class uses WebCourses to provide you with the lecture notes and to post the homeworks
- Announcements for the class will be made on WebCourses' discussion board
- If you need to email the instructor or TAs about a grade, please use Webcourses mail. The university requires that we use the secure WebCourses mail to discuss grades
- If you need to discuss a grade with the instructor or the TA, please do so within two weeks from when the grade has been posted

Grading

The final course grade is based on the following weights:

Homework: 20%	Midterm 1: 26%	Midterm 2: 26%	Final exam: 28%

The letter grade of the course is based on the following intervals:

A- = [89, <92]	A = [92, 100]	
B- = [79, <82]	B = [82, <87]	B+ = [87, <89]
C- = [69, <72]	C = [72, <77]	C+ = [77, <79]
D- = [59, <62]	D = [62, <67]	D+ = [67, <69]
F = [0, <59]		

Collaboration

You are encouraged to collaborate with other students on the homework and exam preparation. You may discuss the homework solutions with your classmates. However, you may not write the homework together with other students. When it's time to write down your homework you should be writing the solution by yourself.

First Week Homework

As of Fall 2014, all faculty are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete the following academic activity by the end of the first week of classes or as soon as possible after adding the course, but no later than August 27th. Failure to do so may result in a delay in the disbursement of your financial aid.

Assignment: Complete the Homework 1 by Friday, January 16. It's posted on Webcourses.