EE557 -- Computer Systems Architecture
Fall 2014
Section 31391D
Instructor: Heidi Ziegler
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Office hours: By Appt

Updated Syllabus 3 Sept

1. Overview

The main objective of EE557 is computer architecture exploration at a more abstract level than in previous courses on architecture. Since architectures are described at a block diagram level in this course, a large number of machines, memory structures, and interconnections will be taught. In EE457, students learned how to design a simple five-stage pipeline in great details, down to the circuit level. In EE557, we assume that these implementation details are known. Students will learn about computer systems as they are designed today, including processors, memories, interconnects and multiprocessors (CMPs). The focus of the course is not on research but on actual, commercial, existing machines.

At the end of this course students will be ready to work on research in the area of computer architecture. They will have the knowledge to design a chip architecture for a computer system. Moreover students will have gained practical experience in using architectural design tools, such as architecture simulators, area/complexity estimators and power/energy estimators, to design processors at the architectural level.

Besides attending one lecture and one discussion session per week, students will complete six homework assignments and two simulation projects.

2. Textbooks

A. Dubois, Annavaram and Stenström: "Parallel Computer Organization and Design," Cambridge University Press, 2012. ISBN: 978-0-521-88675-8.

   Purchase from the USC bookstore or from Amazon.com. REQUIRED.

B. EE557 presentation slides. Purchase from the USC bookstore. REQUIRED.

3. Pre-requisites:

A. EE457: Computer System Organization. (Either take it at USC or take the EE457 placement exam.)

B. Logic design, instruction sets and assembly/machine code programming background are also required.

4. Discussion Session and Attendance:

EE557 (Thursday evening section) has one regular lecture of 2 hours 50 minutes and a 50 minute discussion session per week, over 15 weeks. The discussion session is an opportunity to discuss the material covered in class, the homework and the exams with the TA. At times class material may be expounded during the discussion session. Attendance is not taken but lecture and discussion session attendance is part of the course requirements.

There will be pop quizzes during the semester administered at random times. The quizzes will be very short and will last no more than 5 minutes. They will ask one brief question about the material just taught in the class or in the previous class.

All material/information given out during regular class times and discussion sessions is part of the course. If you have to miss a class or a discussion session, make sure that you catch up by asking a friend to brief you. Also stay informed of homework deadlines, deadline changes, potential problems with homework questions, information on exams, etc., by visiting the EE557 DEN blackboard regularly.

5. Teaching Assistants

There are 2 TAs and one MS Mentor to assist with questions.

Name	Position	Office Hours	Room	Phone
Justin Huang **Sang Wook Do**	TA	Fri 11-1pm Tues 2-4pm	EEB230	213-740-2240
Robert Zhao	MS Mentor	Mon 11-1pm	PHE330	213-740-4372

We do not provide information about the graders.

Per department policies, complaints about homework and project grading issues should be addressed to one of the TAs who will then interact with the graders to resolve them. If you cannot resolve a grading issue with the TA, please come to see me.

Please resolve all grading issues promptly. Do not procrastinate!

6. Course Work:

A. Homework assignments: There will be 6 homework assignments. Homework is assigned electronically through the DEN blackboard on a Tuesday. Homework is due two weeks from assignment, on a Tuesday before 5pm PST.

   i. We use a paperless homework submission, grading and return process. Homework is submitted electronically on the DEN blackboard. Homework must be in PDF (scan it if you need to). If you handwrite your solutions, please make sure that your writing is legible and the pages are in order. Homework will be graded electronically and returned through the DEN blackboard.

   ii. **Late homework** will be accepted via electronic submission until the following Thursday at 5pm PST. The penalty is 25% of the maximum grade if submitted by 5pm on Wednesday and 50% of the maximum grade if submitted by 5pm on Thursday. No homework will be accepted after that. **THESE PROCEDURES AND POLICIES APPLY TO DEN AND NON-DEN STUDENTS.**

B. Simulation projects: There will be two simulation assignments. These assignments do require to use of design tools under Unix but otherwise require very little or no programming. The goal of the first project is to familiarize yourself with the tools. The second project is a microarchitecture design project using the tools. The submission and grading of projects follow the same procedure as for homework.

C. Midterm: Friday 10/24, 2-4pm

D. Final: Tuesday 12/16, 2-4pm

Please understand that there will be NO make-up exam, except in case of personal medical emergency certified by a physician, or of personal accident. Other requests will be denied.

7. Grading Policy

Grading Element	Qty	Percent (%)
Homework Assignment	6	15 (2.5 each)
Simulation Project	2	20 (10 each)
Pop Quiz	8	5
Midterm	1	25
Final	1	35

There is no possibility to earn extra credit in this class. PLEASE DON'T ASK! The final grade will be computed as announced. There is already a lot of work in this class! Do the best you can on each component of the course work you are graded on.

8. Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.-5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

9. Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one own academic work from misuse by others and to avoid using another's work as one's own. All students are expected to understand and abide by these principles.

Please consult: http://www.usc.edu/student-affairs/SJACS/pages/students/academic_integrity.html, Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty.

10. Tentative Fall 2014 Course Schedule

Activity	Date	Topic	Assign Date	Due Date
Lecture 1	8/28	Administration and Intro, Instruction sets		
HWK	9/2		HWK1	
Lecture 2	9/4	Static pipelines		
Lecture 3	9/11	Dynamic pipelines-Tomasulo, Branch prediction		
ADMIN	9/1**2**	Last day to register/drop		
HWK	9/16		HWK2	HWK1
Lecture 4	9/18	Speculative execution		
Lecture 5	9/25	Register renaming /Speculative scheduling, VLIW		
HWK/PRJ	9/30		Project 1 & HWK3	HWK2
Lecture 6	10/2	VLIW, Vector		
Lecture 7	10/9	Memory hierarchies, Cache		
HWK	10/14		HWK4	HWK3
Lecture 8	10/16	Virtual memory		
Lecture 9	10/23	Multiprocessors		
MIDTERM	**10/24**	**FRIDAY 12-2pm (time update)**		
Lecture 10	10/30	Multiprocessors		
HWK/PRJ	11/4		Project 2 & HWK5	HWK4 & Project 1
Lecture 11	11/6	Interconnection		
Lecture 12	11/13	Synchronization, Coherence		
ADMIN	11/1**4**	Last day to drop with W		
HWK	11/18		HWK6	HWK5
Lecture 13	11/20	Coherence, Consistency		
BREAK	**11/27**	**THANKSGIVING**		
HWK/PRJ	12/2			HWK6 & Project 2
Lecture 14	12/4	Chip multiprocessors		
ADMIN	12/**5**	Last day of class		
FINAL	**12/16**	**TUESDAY 11-1pm (time update)**		