

ECE 505 Computer Architecture

When: Thursday 6:00 – 7:50 pm, starting Thursday, Aug. 24, 2018

Where: AK 233

Instructor: Berk Sunar <sunar@wpi.edu>

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Course Description

This course introduces the fundamentals of computer system architecture and organization. Topics include CPU structure and function, addressing modes, instruction formats, memory system organization, memory mapping and hierarchies, concepts of cache and virtual memories, storage systems, standard local buses, high-performance I/O, computer communication, basic principles of operating systems, multiprogramming, multiprocessing, pipelining and memory management. The architecture principles underlying RISC and CISC processors are presented in detail. The course also includes a number of design projects, including simulating a target machine, architecture using a high-level language (HLL).

Prerequisites: Undergraduate course in logic circuits and microprocessor system design, as well as proficiency in assembly language and a structured high-level language such as C or Pascal.

Textbook

Computer Architecture: A Quantitative Approach, 6th Edition, by Hennessy and Patterson Morgan Kaufman (Elsevier), ISBN 9780123838728.

Website

Material relevant to the course will be made available on the course website including lecture notes, assignments, supplementary reading documents. In addition, the website will be updated frequently with announcements, e.g. new assignment, class cancellation etc. <http://users.wpi.edu/~sunar/courses/ece505/>

Tentative Course Outline

Each of following topics will be covered over a period of two to three weeks:

Part 1:

- Introduction to Computer Architecture and Performance Metrics (Chapter 1)

- Instruction Set Architecture (ISA) and Pipelining (Appendix A, C)
- Pipelining and Dynamic Scheduling (Chapter 3)

Midterm

Part 2:

- Cache and Memory (Chapter 2, App. B)
- Multiprocessor and TLP (Chapter 5)
- DLP and GPUs (Chapter 4)

Grading

Grading is based on 4 to 6 projects, one (in-class) Midterm exam, and a (pass/fail) Final presentation.

The weights for the final grade are as follows:

Assignments 40%, Midterm Exam 30%, Final Presentation 30%.

The following grading scale will be used:

>90% A, 80-90% B, 65-80% C, 55-65% D, else F.

Honor Code

Students at WPI are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty.

Students with Disabilities

If you need course adaptations or accommodations because of a disability, or if you have medical information to share with me, please make an appointment with me as soon as possible. If you are entitled to accommodation in accord with documentation on file at the Disabilities Service Office, let me know as soon as possible so I can arrange for the accommodation.