
CSE 352 Hardware Design and Implementation

Credits

4.0 (3 hrs lecture, 3 hr lab)

Lead Instructor

Mark Oskin

Textbook

- *Digital Design & Computer Architecture*, Harris

Course Description

Covers digital circuit design, processor design, and systems integration and embedded-systems issues. Includes substantial hardware laboratory.

Prerequisites

CSE 311; CSE 351.

CE Major Status

Required

Course Objectives

At the end of this course, students should:

1. know how to implement a Boolean function in hardware, and how to analyze the cost and performance of the implementation
2. understand system clocking methodology to implement sequential circuits
3. understand the timing constraints imposed by the clocking methodology and how to analyze a digital system for timing correctness
4. understand the basics of computer arithmetic
5. understand how to implement an instruction set processor using the digital design methodology
6. understand how to use pipelining to improve the performance of a digital circuit
7. understand how to use forwarding, stalling and prediction to address hazards in pipelined processors
8. be able to use design tools to design and implement digital circuits using FPGA technology
9. be able to write and debug assembly language programs, including the use of interrupts and timers for real-time operation

ABET Outcomes

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (e) an ability to identify, formulate, and solve engineering problems
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Course Topics

- Implementation of Boolean functions (6 lectures)
- Implementation of sequential circuits (6 lectures)
- FPGA architectures and CAD tools (2 lectures)
- Y86 processor design (8 lectures)
- Support for real-time, embedded systems (3 lectures)
- Pipelining (3 lectures)