469mcd2024

Master Course Description for EE-469 (ABET sheet)

Title: Computer Architecture I

Credits: 5

UW Course Catalog Description

Coordinator: Scott Hauck, Professor, Electrical and Computer Engineering

Goals: To teach the organization and design of modern microprocessors.

Learning Objectives: At the end of this course students will be able to:

1. Write simple assembly language programs.
2. Identify the major components of a microprocessor.
3. Design a microprocessor that supports a given instruction set.
4. Analyze microprocessor performance, including cache memory systems.
5. Demonstrate understanding of modern microprocessor features.

Textbook: Patterson, Hennessy, *Computer Organization and Design: The Hardware/Software Interface*, ARM Edition, Morgan Kaufmann, 2017.

Prerequisites by Topic:

1. Introduction to Digital Circuits and Systems (EE-271 or CSE-369)
2. Introduction to Programming - C, C++, or Java (CSE-123 or CSE 143)

Topics:

1. Introduction to processor architecture. Performance measures.
2. Assembly language programming.
3. Computer arithmetic.
4. Processor datapaths, control.
5. Pipelining.
6. Memory hierarchy, caches.
7. Advanced topics in computer architecture: ILP, VLIW, Superscalar.

Course Structure: The class meets for four hours every week. There will be a midterm and final, multiple lab assignments (involving the design of a single-cycle and pipelined processor with approximately 8 instructions), and approximately weekly short homework assignments.

Computer Resources: PCs or Laptops with Altera Quartus and Modelsim software installed. Students will design a simple microprocessor through multiple laboratory assignments:

1. Register File
2. Arithmetic Logic Unit
3. Single-cycle CPU
4. Pipelined CPU

Laboratory Resources: None.

Grading: Class grades will be based upon weekly homeworks, the lab assignments, midterm, and final exam.

ABET Student Outcome Coverage: This course addresses the following outcomes:

H = high relevance, M = medium relevance, L = low relevance to course.

(1) *An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics* **(H)**

(2) *An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors* **(M)**

(3) *An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions* **(M)**

(4) *An ability to acquire and apply new knowledge as needed, using appropriate learning strategies* **(L)**

Prepared By: Scott Hauck

Last revised: 12/10/2024