

ECE 4713 – Computer Architecture

Textbook: Computer Organization and Design: The Hardware/Software Interface, 2nd/3rd edition

**The following course outline is based on the 3rd edition.

- 1. Computer Abstractions and Technology**
 - 1.1 Introduction
 - 1.2 Below your program
 - 1.3 Under the covers
 - 1.4 Historical Perspective and Remarks

- 2. Introductions: Language of the Computer**
 - 2.1 Introduction
 - 2.2 Operations of the Computer
 - 2.3 Operands of the Computer Hardware
 - 2.4 Representing Instructions in the Computer
 - 2.5 Logical Operations
 - 2.6 Instructions for Making Decisions
 - 2.7 Supporting Procedures in Computer Hardware
 - 2.8 MIPS Addressing for 32-Bit Immediates and Addresses
 - 2.9 Translating and Starting a Program
 - 2.10 Arrays versus Pointers

- 3. Arithmetic for Computers**
 - 3.1 Introduction
 - 3.2 Signed and Unsigned Numbers
 - 3.3 Addition and Subtraction
 - 3.4 Multiplication
 - 3.5 Division
 - 3.6 Floating Point
 - 3.7 Historical Perspective and Further Reading

- 4. Assessing and Understanding Performance**
 - 4.1 Introduction
 - 4.2 CPU performance and its Factors
 - 4.3 Evaluating Performance
 - 4.4 Concluding Remarks

- 5. The Processor: Datapath and Control**
 - 5.1 Introduction
 - 5.2 Logic Design Convention
 - 5.3 Building a Datapath
 - 5.4 A Simple Implementation Scheme
 - 5.5 A Multicycle Implementation
 - 5.6 Exceptions

- 6. Enhancing Performance with Pipelining**
 - 6.1 An Overview of Pipelining
 - 6.2 A Pipeline Datapath
 - 6.3 Pipeline Control
 - 6.4 Data Hazards and Forwarding

6.5 Data Hazards and Stalls

6.6 Exceptions

7. Large and Fast: Exploiting Memory Hierarchy

7.1 Introduction

7.2 The Basics of Caches

7.3 Measuring and Improving Cache Performance

7.4 Virtual Memory