

Objective

The purpose of this textbook review is to provide an informed recommendation for a new textbook to be used in CSC 3100/3101 – Computer Architecture and Organization. Not only does the current textbook lack up to date information but it does not adequately explain the information.

Recommendation

After searching for several updated textbooks that adequately explain information and provide extensive resources I recommend the following textbook:

Computer Organization and Architecture, 10th Edition

William Stallings

9780134101613

<https://www.pearson.com/us/higher-education/product/Stallings-Computer-Organization-and-Architecture-10th-Edition/9780134101613.html?tab=overview>

https://www.amazon.com/gp/offer-listing/0134101618/ref=dp_olp_rentals?ie=UTF8&f_rental=true

Breadth and Coverage

The course learning outcomes are illustrated below

#	CSC 3100 Course Learning Outcomes
1	Knowledge of fundamental circuit components and techniques for optimizing circuits.
2	Write simple programming constructs and programs using assembly language.
3	Understand the translation of assembly instructions into their binary representation.
4	Describe and understand the processor memory hierarchy.
5	Basic understanding of interrupts, I/O devices, and I/O protocols.
6	General knowledge in microelectronics and their implication on computer design.

Below is a table depicting the course learning outcomes in relation to the new textbook.

Course Learning Outcome	Corresponding Textbook Sections
1	<p>PART THREE: ARITHMETIC AND LOGIC</p> <p>Chapter 9: Number Systems</p> <p>Chapter 10: Computer Arithmetic</p> <p>Chapter 11: Digital Logic</p> <p>This section utilizes all of the number systems presented in the current textbook. IEEE 754 floating point representation uses the 2008 standard instead of the outdated one in the current textbook.</p>
2	<p>Appendix A: Assembly Language, Assemblers, and Compilers</p> <p>In contrast to the current textbook use of Motorola 68k, this textbook uses the more relevant Intel x86 assembly language.</p> <p>The lab section currently uses easy68k as a emulator for Motorola 68k. Unicorn can be used emulator for Intel x86 and many other assembly languages.</p> <p>https://www.unicorn-engine.org</p>
3	<p>Chapter 12: Instruction Sets: Characteristics and Functions</p>

	Chapter 13: Instruction Sets: Addressing Modes and Formats
4	Chapter 12: Instruction Sets: Characteristics and Functions Chapter 13: Instruction Sets: Addressing Modes and Formats Chapter 14: Processor Structure and Function Chapter 15: Reduced Instruction Set Computers (RISCs)
5	Chapter 3: A Top-Level View of Computer Function and Interconnection Chapter 4: Cache Memory Chapter 5: Internal Memory Technology Chapter 7: Input/Output
6	Chapter 3: A Top-Level View of Computer Function and Interconnection Chapter 1: Basic Concepts and Computer Evolution Chapter 2: Performance Issues

This textbook exceeds the standards of tier 1,2, and elective set forth by IEEE/ACM CS2013.

https://www.acm.org/binaries/content/assets/education/cs2013_web_final.pdf

Resources

This textbook conveys information through practical real world examples and practice

- **UPDATED! Homework Problems** have been expanded upon and added to the text with solutions.
- **Case studies** of Intel x86 and embedded ARM architectures supplement and explain material helpful for forming lab assignments.
- **Over 20 Interactive Web Simulations** supplement to major portions of the text to illustrate computer architecture design issues.

Purchase of textbook includes an access code to an interactive online platform which hosts these additional resources.

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PART ONE: OVERVIEW

Chapter 1: Basic Concepts and Computer Evolution

Chapter 2: Performance Issues

PART TWO: THE COMPUTER SYSTEM

Chapter 3: A Top-Level View of Computer Function and Interconnection

Chapter 4: Cache Memory

Chapter 5: Internal Memory Technology

Chapter 6: External Memory

Chapter 7: Input/Output

Chapter 8: Operating System Support

PART THREE: ARITHMETIC AND LOGIC

Chapter 9: Number Systems

Chapter 10: Computer Arithmetic

Chapter 11: Digital Logic

PART FOUR: THE CENTRAL PROCESSING UNIT

Chapter 12: Instruction Sets: Characteristics and Functions

Chapter 13: Instruction Sets: Addressing Modes and Formats

Chapter 14: Processor Structure and Function

Chapter 15: Reduced Instruction Set Computers (RISCs)

Chapter 16: Instruction-Level Parallelism and Superscalar Processors

PART FIVE: PARALLEL ORGANIZATION

Chapter 17: Parallel Processing

Chapter 18: Multicore Computers

Chapter 19: General-Purpose Graphic Processing Units

PART SIX THE CONTROL UNIT

Chapter 20: Control Unit Operation

Chapter 21: Microprogrammed Control

Appendix A Assembly Language, Assemblers, and Compilers

APPENDIX B Projects for Teaching Computer Organization and Architecture