

Course Outcomes	CSC 3501
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CSC 3501: Computer Organization and Design

Credit Hours: 3 hours

Prerequisites:

CSC 2259

Prerequisites by Topics:

Fundamentals of elementary formal logic; strategies to compare relative efficiency of algorithms.

Catalog Course Description:

Credit will not be given for both this course and CSC2280 or EE3750 or EE3755.
Computer arithmetic, design of high-speed adders and multipliers, CPU concepts, instruction fetching and decoding, hardwired control, microprogramming control, main memory, I/O organization, assembly language programming techniques, CPU instruction sets and addressing modes.

Course Outcomes

1. Master the binary and hexadecimal number systems including computer arithmetic,
2. Be familiar with the history and development of modern computers,
3. Be familiar with the Von Neumann architecture,
4. Be familiar with the functional units of the processor such as the register file and arithmetic-logical unit,
5. Be familiar with the basics of systems topics: single-cycle (MIPS), multi-cycle (MIPS), parallel, pipelined, superscalar, and RISC/CISC architectures.
6. Be familiar with the cost-performance issues and design trade-offs in designing and constructing a computer processor including memory.
7. Be familiar with the quantitative performance evaluation of computer systems,
8. Be familiar with the cache subsystem,
9. Be familiar with assembly language programming,
10. Be familiar with the representation of data, addressing modes, instructions sets,
11. Be familiar with the basic knowledge the design of digital logic circuits and apply to computer organization.

Texts and Other Course Materials

Computer Organization & Design: The Hardware/Software Interface - David Patterson and John Hennessey. 1-55860-604-1. HB Latest Morgan Kaufman

Major Topics

- Introduction to processors,
- Numbering systems including 1s and 2s complement addition,
- Instruction set design,
- Machine language programming, assemblers,
- Computer arithmetic,
- The basics of digital logic design and Boolean algebra.
- Register file design,
- Arithmetic logic unit (ALU),
- Pipelining and parallel processors,
- Memory hierarchies

Assignments/Projects/Laboratory Projects/Homework

- Individual written homework assignments (4-6). Each homework consist of various problems, including those from the exercises of the text book. Sample problems
 - Comparison of the processor performance for various types of datapaths under different loads.
 - Assembly language programming
 - Computer Arithmetic problems

Curriculum Category Content (estimated in semester hours)

Area	Core	Advanced	Area	Core	Advanced
Algorithms			Data Structures		
Software Design			Prog. Languages	10	
Computer Arch.	26	5	Math. fundamentals	5	

Relationship to Criterion 3 Outcomes

A	B	C	D	E	F	G	H	I	J	K
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Math and Fundamentals -- 5 hr core:

Numbering systems including 1s and 2s complement addition, subtraction, multiplication and division.

Data Structures:

Algorithms and Software:

Computer Organization and Architecture -- 26 hr core/5 hr advanced:

Introduction to microprocessors, , Instruction set design, Computer arithmetic, The basics of digital logic design and Boolean algebra, Register file design, Arithmetic logic unit (ALU), Pipelining and parallel processors, Memory hierarchies,

Concepts of Programming Languages-- 10 hr core:

Machine language programming, assemblers.

Social and Ethical Issues:

Oral Communication (presentations)

Written Communication:

Students are required to submit 4-6 written home works involving discussions of computer design issues.

Course Coordinator: Dr. Arjan Duresi

Last Modified: May 9, 2007