School of Computer Science

Course Title: Fundamentals of Computer Systems **Date:** 10/30/03

Course Number: COP-3402

Number of Credits: 3

Subject Area: Computer Systems	**Subject Area Coordinator:** Masoud Sadjadi **email:** sadjadi@cis.fiu.edu
Catalog Description: Overview of computer systems organization. Data representation. Machine and assembly language programming.	
Textbook: Introduction to Computing Systems, 2nd Edition Yale N. Patt, Sanjay J. Patel McGraw-Hill (ISBN: 0072467509)	
References:	
Prerequisites Courses: COP-2210 or equivalent	
Corequisites Courses: MAD 2104	

Type: Required

Prerequisites Topics:

- High level programming language constructs
- Function call/return
- Parameters of a function(method)

Course Outcomes:

1. Master the representations of numeric and character data
2. Master the implementation of some basic combinational circuits, registers and memories
3. Be familiar with the data path of a simple von Neumann architecture and its relation to the instruction execution cycle
4. Master simple machine and assembly language programming
5. Master the implementation of high-level language constructs in lower levels: selection, iteration, function call/return

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Outline

Topic	Number of Lecture Hours	Outcome
• Machine level representation o Numeric data representation o Signed & unsigned representation o Fixed- and floating-point systems o Integer arithmetic o Boolean operations	8	1
• Digital logic o Fundamental building blocks (logic gates, combinational circuits) o Von Neumann model o Instruction execution cycle	8	2,3
• Assembly level machine organization o Instruction sets and types o Assembly language programming o Addressing modes o Subroutines and system routines o I/O and interrupts o Bit level manipulation o Assembly process and linking	14	4,5
• Introduction to architecture o Hierarchy of virtual machines o Interpretation and translation o Simple machine architecture	8	3

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Course Outcomes Emphasized in Laboratory Projects / Assignments

	Outcome	Number of Weeks
1	Data representation Outcome: 1	1
2	Digital circuit design Outcomes: 2	2
3	Architecture concepts Outcomes: 3	2
4	Machine language programming Outcomes: 4	2
5	Assembly language programming Outcomes: 5	2
6	Assembly language programming Outcomes: 5	2

Oral and Written Communication:

No significant coverage

Social and Ethical Implications of Computing Topics

No significant coverage

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Approximate number of credit hours devoted to fundamental CS topics

Topic	Core Hours	Advanced Hours
Algorithms:		
Software Design:		
Computer Organization and Architecture:	**2.0**	
Data Structures:		
Concepts of Programming Languages:	**1.0**	

Theoretical Contents

Topic	Class time
Boolean algebra	1.0

Problem Analysis Experiences

Implementation of high level programming language constructs in low level languages

Solution Design Experiences

1.	Digital circuit design
2.	Assembly language programming

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The Coverage of Knowledge Units within Computer Science Body of Knowledge[1]

Knowledge Unit	Topic	Lecture Hours
PL2	Virtual machine, hierarchy of virtual machines, intermediate languages	8
AR1	History of computer architecture, fundamental logic circuits, gate delays	8
AR2	Bits, bytes, and words, numeric data representation, fixed- and floating-point systems, signed and twos-complement representations, nonnumeric data (character codes, graphical data), representation of records and arrays	8
AR3	von Neumann machine, control unit; instruction fetch, decode, and execution, instruction sets and types (data manipulation, control, I/O), assembly/machine language programming, instruction formats, addressing modes, subroutine call and return mechanisms, I/O and interrupts	14

[1]See http://www.computer.org/education/cc2001/final/chapter05.htm for a description of Computer Science Knowledge units