Administrative Unit: Computer and Mathematical Sciences Department

Course Prefix and Number: CISS 420

Course Title: Computer Architecture

Number of Credit Hours: 3  Lecture Hours: 3  Laboratory Hours: 0

Catalog Description: Introduces fundamental concepts of computer architecture including data representation, computer arithmetic, Boolean algebra, combinational logic design, sequential circuits, registers and counters, memory and programmable logic devices, instruction set architecture, CPU design, input-output, memory systems. Prerequisites: CISS 245 or CISS 242 and CISS 243. Offered even Spring.

Prerequisite(s)/Corequisite(s): CISS 245 or CISS 242 and CISS 243.

Text(s): Most current editions of the following:


Course Objectives:

• To conceptualize the underlying technology of modern electronic digital computers.
• To utilize design methods to create combinatorial and sequential circuits.
• To design a microprocessor.
• To learn methods of implementing I/O.
• To learn techniques and methods of implementing memory systems.

Measurable Learning Outcomes:

• Demonstrate a digital electronic signal.
• Manipulate digital electronic signals using AND, OR, NOT, NAND, NOR, XOR, and XNOR gates, as well as tri-state gates.
• Create combinatorial circuits using Karnaugh maps and Boolean algebra, including multiplexers, decoders, encoders, comparators, and adders.
• Create sequential circuits using flip-flops, counters, registers, and memory.
• Create complex sequential circuits using a finite state machine.
• Create a microprocessor based upon a finite state machine.
• Describe methods of communication between components of a computer system.
• Describe methods of implementing memory systems, including virtual memory.

Topical Outline (major areas of coverage):
• Digital computers and information
• Combinational logic circuits
• Combinational logic design
• Sequential circuits
• Registers and counters
• Memory and programmable logic devices
• Register transfer and data paths
• Sequencing and control
• Instruction set architecture
• Central processing unit designs
• Input-output and communication
• Memory systems

Material from this course may be tested on the Major Field Test (MFT) administered during the Culminating Experience course for the degree.

Recommended maximum class size for this course: **16**

Library Resources: Online databases are available at http://www.ccis.edu/offices/library/resources.asp. You may access them from off-campus using your eServices login and password when prompted.

Prepared by: **Lawrence West**

Date: **November 17, 2005**

**NOTE:** The intention of the master syllabus is to provide an outline of the contents of this course, as specified by the faculty of Columbia College, regardless of who teaches the course, when it is taught or where it is taught. Faculty members teaching this course for Columbia College are expected to facilitate learning pursuant to the course objectives and cover the subjects listed in the topical outline. However, instructors are also encouraged to cover additional topics of interest so long as those topics are relevant to the course’s subject. The master syllabus is, therefore, prescriptive in nature but also allows for a diversity of individual approaches to course material.

Office of Academic Affairs
12/04