COURSE DESCRIPTION

Dept., Number	**CSCI 310**	Course Title	**Introduction to Computer Architecture**
Semester hours	3	Course Coordinator	J. Linder
		URL (if any):	

Current Catalog Description

(Prereq. Grade of C or above in Computer Science 150, 210, and Mathematics 174) An introduction to the fundamental aspects of a computer system's structure and behavior; binary arithmetic, combinational logic, circuit design, instruction sets , register operations and flip-flops, control system functions, interrupt structures, memories, interrupt structures, processors, and performance measures will be covered.

Textbook

Computer Organization and Design: The Hardware/Software Interface 3rd Ed, .David A. Patterson and John L. Hennessy, Morgan Kaufmann Publishers, Inc., 2005.

Course Goals

Upon completion of this course, students should, at a minimum be able to:

1. Describe the basic machine cycle of a typical Von Neumann machine.
2. Demonstrate the ability to translate boolean algebra to logic diagrams.
3. Be able to apply the following in new situations: knowledge of:
    a. computer performance in terms of space and time tradeoffs
    b. instruction set architecture design and implementation
    c. representation of integer numbers
    d. datapath and control mechanisms used in processor implementations
    e. processor implementation alternatives (single-cycle, multiple-cycle, and pipelined implementations)
    f. memory hierarchy design
4. Be able to apply: knowledge of
    a. arithmetic algorithms multiprocessor and real-time scheduling
    b. cache design
5. Have been introduced to:
    a. representation of floating-point numbers
    b. virtual memory
    c. interfacing processors and peripherals

Prerequisites by Topic

1. An understanding of data representation.
2. An understanding of assembly language programming concepts.

Major Topics Covered in the Course

1. Binary arithmetic (2 hours)
2. Combinatorial logic (4 hours)
3. Circuit design (4 hours)
4. Instruction sets (3 hours)
5. Register operations (3 hours)
6. Control system functions (5 hours)
7. Pipeline control (2 hours)
8.Memories (2 hours)
9. Interrupt structures (2 hours)
10. Processors (8 hours)
11. Performance measures (3 hours)
12. Ethical issues of architectural design (1 hour)

Laboratory projects (specify number of weeks on each)

Complete a small computer electronic lab kit. The students are required to test circuits, strip wires, complete logic gates, and follow detailed lab instructions. Each student is required to keep a written log of his/her accomplishments. (12 weeks, 1 hour per week)
Complete 3 or 4 programming assignments in the MIPS assembly language. (2 weeks for each)

Estimate Curriculum Category Content (Semester hours)

Area	Core	Advanced	Area	Core	Advanced
Algorithms			Data Structures		
Software Design			Prog. Languages		
Comp. Arch.	2	1			

Oral and Written Communications

Every student is required to submit at least __1___ written reports (not including exams, tests, quizzes, or commented programs) of typically __10___ pages and to make __0___ oral presentations of typically _____ minute's duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.

Social and Ethical Issues

Please list the topics that address the social and ethical implications of computing covered in all course sections. Estimate the class time spent on each topic. In what ways are the students in this course graded on their understanding of these topics (e.g., test questions, essays, oral presentations, and so forth)?

Theoretical Content

Please list the types of theoretical material covered, and estimate the time devoted to such coverage.

Binary arithmetic, combinatorial logic, circuit design, instruction sets, register operations and flip-flops, control system functions, memories, interrupt structures, processors, performance measures (70% of the course)

Problem Analysis

Please describe the analysis experiences common to all course sections.

All programming assignments require problem analysis.

Solution Design

Please describe the design experiences common to all course sections.

All programming assignments require a formal design description.