COURSE DESCRIPTION

Department and Course Number:  CSC 237  
Course Coordinator:  Behnam S. Arad  

Course Title:  Microprocessor Systems Architecture  
Total Credits:  3  

Current Catalog Description:  Microprocessor/microcomputer architecture and hardware/software interfacing design. RISC vs. CISC architecture in depth, case studies of several popular commercial advanced 32-bit microprocessors. Microcomputer firmware architecture is discussed and illustrated with detailed examples. Term project in which students specify, design and build the hardware and firmware of a computer system. Prerequisite:  CSc 205.

Textbook:


References:

Recent papers on computer architecture from various journals such as IEEE Transactions on Computers, ACM communications, and IEEE Computer Magazine.

Course Goals:

To provide the students with an understanding of basic quantitative principles of microprocessor systems design, performance and cost analysis, advanced arithmetic algorithm design trade offs, CPU instruction set design principles, CPU data path design issues, input/output interface design issues, memory hierarchy design issues, pipelining and instruction-level parallelism, and multi-processor design issues. To give students an overview of several advanced microprocessors.

Prerequisites by Topic

1. Introductory digital logic design
2. Basic Computer organization
3. Machine language programming
4. Basic Programming techniques

Major Topics Covered in the Course

1. Performance and cost analysis
2. Instruction set design trade offs
3. Computer Arithmetic
4. Data path Design
5. Speculative Execution
6. Trace Caches
7. Pipelined and Superscalar architectures
8. Instruction-level parallelism
9. RISC vs CISC Architectures
10. Memory System Architecture and Design
11. Multiprocessor Architectures
12. Survey of several advanced microprocessors

**Laboratory projects**

Each student will design and simulate a microcomputer and submit a report on his/her design.

**Estimate CSAB Category Content**

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<tr>
<th>CORE</th>
<th>ADVANCED</th>
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<tr>
<td>Data Structures</td>
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<td>Algorithms</td>
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<td>Software Design</td>
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<td>Computer Organization and Architecture</td>
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<td>Concept of Programming Languages</td>
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**Oral and Written Communications**

Every student is required to submit at least one written report of typically 10 pages and to make one oral presentation of typically 15 to 20 minutes duration.

**Social and Ethical Issues**

No significant component

**Theoretical Content**

The course covers basic quantitative principles of computer design, instruction set design principles, space vs time optimization of arithmetic unit, RISC vs CISC, pipelining and parallel processing concepts, and hierarchical memory design principles.

**Analysis and Design**

All students are required to analyze the requirements specified in the course assignments for various aspects of computer systems and to design detailed implementations meeting those requirements.

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