EENG 4320: Computer Architecture and Design (Elective)

Syllabus

Catalog Description:
EENG 4320: Computer Architecture and Design
Introduction to computer architecture, RISC/CISC, processors, data path, control, ALU; pipelining, memory, cache, I/O, digital logic; micro architecture, instruction sets, addressing modes; operating systems, virtual memory, processes, assembly language. Prerequisite: EENG 3302 and EENG 3307.

Prerequisites:
EENG 3302 - Digital Systems and
EENG 3307 - Microprocessors

Credits: ( 3 hours lecture, 0 hours laboratory per week )

Text(s):

Additional Material: Handouts

Course Coordinator: David Hoe, Assistant Professor, Electrical Engineering

Topics Covered: (paragraph of topics separated by semicolons)
Introduction to Computer Architecture: structured computer organization, hardwired and programmed control, example computer families; Computer Systems: processors, memory organization, cache design, I/O organization; Digital Logic: circuits, memory, buses, hardware for integer and floating point operations; Microarchitecture: microprogramming, microinstructions, data path and control unit design; Instruction Set Architecture: opcodes, addressing modes, instruction formats and types; Operating Systems: virtual memory, processes; Assembly Language: macros, assemblers, linking and loading;

Evaluation Methods: (only items in dark print apply):
1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Objectives: By the end of this course students will be able to:
1. Describe the interface between software and hardware [1, 2]
2. Explain computer systems organization and design [1,2,3]
3. Solve design problems at the digital logic, microarchitecture, instruction set
architecture level and explain the function of each level [1,2]
4. Explain how the hardware executes programs [1, 2, 3, 4]
5. Analyze sample computer architectures and provide technical input on computer system design issues [1, 2, 3]
6. Describe the techniques used to improve performance of computer systems [1, 2]

1Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Program Outcomes (only items in dark print apply)²: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering; [1,2,4]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering; [3,4,5]
3. have the ability to analyze electrical circuits, devices, and systems; [1-4]
4. have the ability to design electrical circuits, devices, and systems to meet application requirements; [1-4]
5. have the ability to design and conduct experiments, and analyze and interpret experimental results;
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods; [3,5,6]
7. have effective written, visual, and oral communication skills;
8. possess an educational background to understand the global context in which engineering is practiced, including:
   a. knowledge of contemporary issues related to science and engineering;
   b. the impact of engineering on society;
   c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers.

²Numbers in brackets refer to course objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

<table>
<thead>
<tr>
<th>Mathematics and Basic Sciences:</th>
<th>hours</th>
</tr>
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<tbody>
<tr>
<td>Engineering Sciences and Design:</td>
<td>3</td>
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<td>General Education Component:</td>
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Prepared By: Troy Henson  Date: 23 May 2002
Updated By: Gordon Cumming  Date: 17 Aug 2002
Updated By: Mukul V. Shirvaikar  Date: 06 Aug 2003
Mukul V. Shirvaikar  Date: 25 Aug 2004
       Date: 20 Aug 2005
Updated By: David Hoe  Date: 26 Aug 2009