EENG 5340: Advanced Topics in EE: Computer Architecture and Design

Syllabus

Catalog Description:
EENG 5340: Advanced Topics in EE: 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 of consent of instructor.

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

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


Additional Material: Handouts. Journal articles

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. Analyze the techniques used to improve performance of computer systems \[1, 2\]
7. Appraise the latest research in computer architecture presented in journals \[1, 3, 5\].

1 Numbers 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. Possess a breadth and depth of knowledge in electrical and computer engineering. Students will possess and be able to apply knowledge and principles at a graduate level in two or more of the following areas utilizing modern engineering tools: electronics, power systems, controls, advanced engineering mathematics, signal processing, communications, real-time systems, computer systems, electromagnetic and power electronics. \[1, 2, 3, 4, 5, 7\]
2. Possess and demonstrate oral and written communication skills: Students will be adequately prepared for entrance into advanced careers or into a doctoral program through reports, papers, publications, or presentations. \[2, 4, 5, 6, 7\]
3. Demonstrate the capability to perform independent learning and investigation: Students will successfully address electrical or computer engineering problems through independent research activity in coursework or a thesis. \[3, 5, 6, 7\]

2 Numbers 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>
</thead>
<tbody>
<tr>
<td>Engineering Sciences and Design:</td>
<td>3</td>
</tr>
<tr>
<td>General Education Component:</td>
<td>hours</td>
</tr>
</tbody>
</table>

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
                                Date: 25 Aug 2004
                                Date: 20 Aug 2005

Updated By: David Hoe           Date: 26 Aug 2009