Core Engineering Program: ABET Course Outcomes

Course: ENGN1640 – Design of Computing Systems
Instructor: Sherief Reda
Revision Date: Spring 2011

Course Description: Architectures of computers with reference to current microprocessors, traditional computers, and parallel processors. Some concepts discussed include computer design fundamentals, computer performance analysis, arithmetic units, instruction set design principles and examples, basic and intermediate pipelining concepts, instruction-level parallelism, memory hierarchy and memory structures, I/O, and bussing. Laboratory fundamentals include prototyping of processors in programmable logic fabrics and use of Verilog to describe computing hardware.

Prerequisite: ENGN1630

Outcomes: Students completing ENGN1640 shall:

1. Identify similarities and differences between instruction set architectures, understand tradeoffs in instruction sets and computer organization, and apply knowledge of instruction sets and computer organization to quantify application performance.
   Addresses ABET outcomes: a, b, e, k
   Assessment: lab completions, homework, exams

2. Understanding how to describe hardware in hardware definition languages like Verilog and real issues (e.g., timing and area) arising in the implementation of computing operations in hardware.
   Addresses ABET outcome: a, b, e, k, l
   Assessment: labs completions, exams

3. Understand basic pipelining and other architectural and organizational techniques for increased performance, including pipelining techniques, mitigation of pipeline hazards, parallel execution through instruction level parallelism, and basic multiprocessor issues.
   Addresses ABET outcome: a, e, j
   Assessment: homework, exams

4. Understand memory hierarchy and virtual memory, including tradeoffs and difficulties inherent in different approaches.
   Addresses ABET outcome: a, e
   Assessment: homework, labs, exams

5. Understand basic issues in processor I/O including interrupts.
   Addresses ABET outcome: a, e
   Assessment: homework, exams