COMP 4300, Computer Architecture

Credit hours: 3 lecture
Contact hours: 3 lecture

Catalog Description: Comparison of computer architectures, emphasizing the relationships between system software and hardware. Includes processor control and datapath organization, memory subsystem design, instruction set design, processor simulation, and quantitative analysis of computer performance.

Prerequisites: COMP 3350
Corequisites: None

Required Course (SWEN) Selected Elective Course (CSCI, WIRS)

Instructor or Course Coordinator: Dr. Richard Chapman

Required Textbook
John Hennessy and David Patterson, Computer Architecture: A Quantitative Approach, 2011

Course Outcomes
The student will be able to
• gain proficiency in the design of modern computer systems at the architectural level.
• quantitatively analyze the impact of design trade offs on system performance.
• develop software that utilizes the underlying architecture efficiently.

Topics Covered
• Introduction, main problems of computer design. First lesson in VHDL. Read Chapter One of Hennessy and Patterson (3 hours)
• Second lesson in VHDL. Cost and Performance Measurement. Control logic and datapath (6 hours).
• Instruction Sets, Instruction Decoders. Writing a VHDL instruction decoder. Read Hennessy and Patterson Appendix B (6 hours).
• First exploration of Von Neumann Bottleneck. Memory Hierarchy explored. Designing a Datapath with VHDL. Read Hennessey and Patterson Appendix C. (6 hours)
• Pipelining. Arithmetic-Logic Units. Effective Address Computation. Read Hennessey and Patterson Appendix A (6 hours).
• Instruction Level Parallelism. Superscalar and VLIW processors. Read Hennessy and Patterson Chapters Two, Three. (6 hours)
• Memory Hierarchy Revisited. Caches. Virtual Memory. Hennessy and Patterson Chapters 5, 6 (6 hours).
• Storage Systems. Hennessy and Patterson Chapter 4 (6 hours).
• Exam, Catch-up and review (3 hours).

Course Requirements
- Homework Assignments (40%)
- Exams (60%)

Syllabus prepared: Spring 2016