University of Wisconsin - Madison  
College of Engineering [EGR]  
Last Offered: 2015-2016 Spring [1164]  
Direct Link to this Syllabus :
http://aefis.wisc.edu/index.cfm/page/CourseAdmin.ViewABET?coursecatalogid=49&pdf=True

1. E C E 552, Introduction to Computer Architecture  
2. Credits : 3  Contact Hours : 3.8  
3. Textbook and Materials : Computer Organization and Design: The Hardware/Software Interface; Patterson & Hennessy; 4th; 2011  
   a. Other Supplemental Materials : None

   • Specific Course Information :
   
   a. Brief description of the content of the course (Course Catalog Description) : The design of computer systems and components. Processor design, instruction set design, and addressing; control structures and microprogramming; memory management, caches, and memory hierarchies; and interrupts and I/O structures.
   
   b. Pre-requisites or Co-requisites : ECE/Comp Sci 352 & Comp Sci/ECE 354
   
   c. This is a Selected Elective course.

   • Specific Goals for the Course :

   a. Course Outcomes :

   1. Students will be able to use standard performance metrics to compare performance of different digital systems
   2. Students will be able to design a pipelined data path for a RISC (reduced instruction set computer) instruction set and be familiar with concepts of data dependence, pipelined hazards and out of order execution.
   3. Students will be able to design basic data and control cache subsystems and understand basic memory organization
   4. Students will be able to design a pipelined RISC micro-processor system with data...
cache using computer aided design tool and validate the correctness of the design using logic simulation.

- **ABET Student Learning Outcomes:**

  (a) Ability to apply mathematics, science and engineering principles.
  (b) Ability to design and conduct experiments, analyze and interpret data.
  (c) Ability to design a system, component, or process to meet desired needs.
  (d) Ability to function on multidisciplinary teams.
  (e) Ability to identify, formulate and solve engineering problems.
  (g) Ability to communicate effectively.
  (h) The broad education necessary to understand the impact of engineering solutions in a global and societal context.
  (i) Recognition of the need for and an ability to engage in life-long learning.
  (j) Knowledge of contemporary issues.
  (k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

- **Brief List of Topics to be Covered:**
  1. Introduction, basic computer organization
  2. Instruction formats, instruction sets and their design
  3. ALU design: Adders, subtracters, logic operations
  4. Datapath design
  5. Control design: Hardwired control, microprogrammed control
  6. More on arithmetic: Multiplication, division, floating point arithmetic
  7. RISC machines
  8. Pipelining
  9. Memory systems and error detection and error correction coding
  10. I/O