Computer Science Department

Course Syllabus

CS221 - Computer Architecture

Catalog Description: This computer science course covers the evolution of computer architecture and the factors influencing the design of hardware and software elements of computer systems. Topics include: instruction set Architectures; performance, performance measures and performance evaluation for computer architectures. processor micro-architecture, pipelining and pipelining hazards; cache and virtual memory organizations; Secondary memory and Redundant Array of Independent Disks (RAID); concepts of parallel architectures (such as Superscaler).

Credit Hours: **4 Credit hours:** **4** Lectures per week **0** Labs. per week **0** Recitation per week

Prerequisites: CS220 – Computer Organization and Assembly Language

Course Learning Outcomes: The goals are to introduce students to: the computer design process; performance and cost analysis; memory system design issues; instruction set design; pipelining; I/O and bus design; advanced topics.
At the completion of this course, students will understand:
1. the definition of computer architecture
2. the major components of modern computer architecture
3. the functionality and trade-offs of several cache memory designs
4. the instruction pipeline
5. the differences between RISC, CISC, and Superscalar architectures
6. parallelism in terms of both single and multiple processors
7. the issues and trade-offs involved in instruction set design
8. the unique architectures of multiprocessors and multicomputers

Major Topics:
- Introduction & vocabulary, History of computer architecture, Overview of computer organization
- Overall CPU organization, High-level issues in CPU design, Memory Hierarchy and cache, External memory, RAID organization of hard disks.
- Representing information digitally, Instruction Sets [CISC/RISC], Addressing Modes.
- Pipeline design, Branch prediction , Superscalar Design
- Operating System Issues, virtual memory, Paging & Segmentation
- Parallel Processing , Cache coherence in parallel computing
- Parallel computer architectures, Distributed computing

Text Books: The Essentials of Computer Organization and Architecture, Null and Lobur, Jones and Bartlett Pub, 2012. ISBN 0-7637-0444-X. 1.

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Grading:

- The grading scale for this course is:
  - . 95 - 100 A+ Passing
  - . 90 - 94 A Passing
  - . 85 - 89 B+ Passing
  - . 80 - 84 B Passing
  - . 75 - 79 C+ Passing
  - . 70 - 74 C Passing
  - . 65 - 69 D+ Passing
  - . 60 - 64 D Passing
  - . 0 - 59 F Failing

- Final grades will be determined based on the following components:
  - . 60% Semester Work
  - . 40% Final Exam

- Students may not do any additional work for extra credit nor resubmit any graded activity to raise a final grade.

- Late submissions will not be accepted for any graded activity for any reason.

- Studentshave one week to request the re-grading of any semester work.

Attendance Policy:

Students should attend 80% of the overall course hours taught in the semester as per the University regulations.

If a student fails to achieve this portion, he/she shall not be allowed to appear in the final exam and shall be awarded “DN” grade and repeat the course.

Cheating and Plagiarism Policy:

The instructor will use several manual and automated means to detect cheating and/or plagiarism in any work submitted by students for this course.

When a student is suspected of cheating or plagiarism, the instructor raises the issue to the disciplinary committee.

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Communications:

Registered students will be given access to a section of the Blackboard Learning System for this course. Bb will used as the primary mechanism to disseminate course information, including announcements, lecture slides, assignments, and grades.

Communication with the instructor on issues relating to the individual student should be conducted using CIS email, via telephone, or in person.