Computer Science Department

Course Syllabus

CS423 - Parallel Computer Architecture & Programming

Catalog Description: Design and principles of parallel architectures, asynchronous parallel languages. Naming, latency, bandwidth, and synchronization in parallel machines. Distributed memory, shared memory, message passing, data flow. Specification of parallelism, interprocess communication and synchronization, design of parallel programs for scientific computation and distributed systems. Survey of existing multiprocessor systems.

Credit Hours: **3 Credit hours:** **3** Lectures per week **0** Labs. per week **0** Recitation per week

Prerequisites: CS330

Course Learning Outcomes:
1. Understand the parallel computer architecture
2. Apply the modern programming techniques to a variety of concurrent, parallel and distributed computing scenarios.

Major Topics:
- Parallel Architecture
- Parallel Programming
- Fundamental design issues
- Programming for Performance
- Workload-Driven Evaluation
- Shared Physical Memory
- Shared Memory Multiprocessors
- Snoop-Based Multiprocessor Design
- Scalable Multiprocessors
- Directory-Based Cache Coherence
- Scaling
- Hardware Trade-Offs
- Software Trade-Offs
- Interconnection Network Design
- Latency Tolerance

Text Books:
• Required: Parallel Computer Architecture: A Hardware/Software Approach, Culler, Singh, and Gupta, 1st edition, Morgan Kaufmann, 1998.
• Optional: Parallel Programming in C with MPI and OpenMP, Quinn, 1st edition, McGraw Hill, 2003.
• Optional: Advanced Computer Architecture: Parallelism, Scalability, Programmability, Hwang, McGraw-Hill, 1993.
• Optional: Scalable Parallel Computing: Technology, Architecture, Programming, Hwang and Xu, WCB/McGraw-Hill, 1998.
• Optional: Advanced Computer Architecture with Parallel Programming, Wang,

Hwang, and Wu, McGraw-Hill, 19993.
• Optional: Parallel Computing on Distributed Memory Multiprocessors, Ozguner and Ercal, Springer, 1993.
• Optional: Parallel Computers2: Architecture, programming, and Algorithms, Hockney and Jesshope, CRC Press, 1988.

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.

Course Syllabus

CS423 - Parallel Computer Architecture & Programming

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.