

Course Name:CS-315, Parallel and Distributed Computing

Credit Hours: 2-1

Contact Hours: 2-3

Pre-requisites: Operating Systems

Course Introduction:

The "Parallel and Distributed Computing" course covers the fundamental principles and techniques of parallel and distributed computing, focusing on the design, implementation, and optimization of parallel and distributed algorithms and systems. The course also explores the application of parallel and distributed computing to real-world problems in various domains, such as data analytics, machine learning, scientific simulations, and cloud computing.

CLO No	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understand the principles and challenges of parallel and distributed computing	C2 (Understand)
CLO-2	Understand and optimize performance and scalability of parallel and distributed systems	C2 (Understand)
CLO-3	Apply parallel and distributed computing techniques to solve real-world problems in various domains	C3 (Apply)
CLO-4	Analyze and evaluate the performance of parallel and distributed systems	C4 (Analyze)

Course Plan:

#	Weekly Distribution of Course Contents
Week-1	Introduction to Parallel and Distributed Computing
Week-2	Comparative analysis of Parallel and Distributed Computing
Week-3	Performance Metrics
Week-4	Memory Hierarchy and CPU Architecture
Week-5	Parallel Programming Models
Week-6	Parallelism in Multi-core Processors and GPUs, with Message Passing Interface (MPI)
Week-7	Parallelism in Multi-core Processors and GPUs, with OpenMP

Week-8	Distributed Computing Environments, Coordination and Synchronization
Week-9	Coordination and Synchronization, Cloud Computing Architecture
Week-10	Cloud Computing Services
Week-11	Cloud Storage and Data Management
Week-12	High-Performance Computing, Supercomputers and High-Performance Clusters
Week-13	Performance Tuning and Optimization, Benchmarking and Profiling
Week-14	Quantum Computing
Week-15	Distributed Computing Applications in Big Data Analytics
Week-16	Distributed Computing Applications in Machine Learning, Computer Vision and Image Processing, Scientific Simulations

Reference Materials:

1. "Distributed Systems: Concepts and Design" by George Coulouris, Jean Dollimore, and Tim Kindberg (2011)
2. "Parallel Computing: Theory and Practice" by Michael J. Quinn (2018)
3. "High Performance Computing" by Charles Severance and Kevin Dowd (2018)
4. "Big Data: Principles and best practices of scalable real-time data systems" by Nathan Marz and James Warren (2015)