Course Code	CSE 502
Course Name	Foundations of Parallel Programming
Credits	4
Course Offered to	UG/PG
Course Description	Constrained by the heat and power usage, today all computing devices are composed of multicore processors, with little or no increase in clock speed per core. In order to harness the power of the multicore processors, software applications being developed also needs to be parallelized. This makes parallel programming a very important paradigm of computing.This course introduces the fundamentals of parallel programming. It will cover both traditional approaches and new advancements in the area of parallel programming. A key aim of this course is to provide hands-on knowledge on parallel programming by writing parallel programs in different programming models taught in this course.

Pre-requisites

Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)
CSE101, CSE102, CSE201	Experience with C/C++ programming	

*Please insert more rows if required

Post Conditions*(For suggestions on verbs please refer the second sheet)

CO1	CO2	CO3	CO4
Understand the fundamentals of parallel programming and different programming models for parallel programming that are supported by wide range of industry	Write shared memory parallel programs using the traditional thread based approach, widely used OpenMP library and the modern asynchronous dynamic task programming model	Write distributed memory parallel programs as well as hybrid distributed-shared memory parallel program	Reason between the productivity and performance offered by different parallel programming models

Weekly Lecture Plan

Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial
1	Introduction	CO1, CO2	
2	Shared memory parallel programming using POSIX Thread APIs	C01, CO2	
3	Introduction to dynamic task parallelism	CO1,CO2	
4	Programming using dynamic task parallelism	CO1,CO2	

5	Task scheduling	CO1	
6	Performance analysis of task scheduling	CO1, C04	
7	Shared memory parallel programming using OpenMP	CO1, CO2	
8	Introduction to distribiuted memory parallel programming	CO1	
9	Message Passing Interface	C01, C03	
10	Hybrid parallelism using MPI and OpenMP	CO1,C02,CO3, C04	
11	Partitioned Global Address Space (PGAS) programming models	C01, C03, C04	
12	Hybrid parallelism by integrating dynamic tasking in PGAS programming	CO1,C02,CO3, C04	
13	Spill Over		

Weekly Lab Plan

Week Number	Laboratory Exercise	COs Met	Platform (Hardware/Software)
	Aligned with the lectures		

*Please insert more rows if required

Assessment Plan

Type of Evaluation	% Contribution in Grade
Class participation	5
Quiz	10
Laboratory	15
Project	20
Mid-sem	20
End-sem	30

*Please insert more row for other type of Evaluation

Resource Material

Type	Title
Textbook	
	There is no textbook for the course, so students should be sure to come to every class. We would provide course notes or web links to online materials depending on the lecture.