

Course Description Form

1. Course Name:
Parallel Processing Paradigm / Third Class
2. Course Code:
3. Semester
Annual
4. description preparation date:
1/4/2025
5. Available attendance forms:
attendance only
6. Number of credit hours (total)/number of units (total):
150 hours: 12 hours per week (6 theoretical, 6 practical).
7. course administrator name (mention all, if more than one)

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8. Course objectives

Course objectives

- 1.To develop problem solving skills and understanding of parallel programming techniques.
- 2.To understand how to write a parallel program using paradigms.
- 3.This course deals with the basic concept parallel computing.
4. To understand Shared memory systems and distributed memory systems.

9. Teaching and learning strategies

The strategy	The main strategy that will be adopted in delivering this programming methods is to encourage students' participation in the exercises, while at the same time refining and expanding their thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.
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10. Course Structure						
week	hours	Required learning outcomes	unit or subject name	Learning method	Evaluation method	
1-2	12 Theoretical 12 practical	The student must be able to understand the basic of parallel processing system	Motivation for parallel programming Need to increasing performance	A theoretical presentation using illustrative diagrams + applied practical lectures	Achievement test + discussion and question	
			Building parallel system			
3-6	18 Theoretical 18 practical	The student should be able to recognize how parallel computing are work.	Need to write parallel programs	A theoretical presentation using illustrative diagrams + applied practical lectures + seminars	Achievement test + discussion and question class assignment	
			How to write parallel programs.			
			Concurrency, parallel, distributed.			
7	6 Theoretical 6 practical	The student should be able to Recognize how parallel computing are work.	- Process, multitasking and threading - Instruction level parallelism	A theoretical presentation using illustrative diagrams + applied practical lectures	Achievement test + discussion and question	
8-13	36 Theoretical 36 practical	The student should be able to design, write, and run a parallel program.	SIMD	A theoretical presentation using illustrative diagrams + applied practical lectures + seminars	Achievement test + discussion and question class assignment	
			MIMD			
			Parallel program design			
			Writing and running parallel program			

14-19	36 Theoretical 36 practical	The student should be able to apply the basics of MPI programming, including compilation and execution.	Basic MPI programming	A theoretical presentation using illustrative diagrams + applied practical lectures + seminars	Achievement test + discussion and question + class assignment
			Compilation and execution		
			MPI programs		
			MPI_Init and MPI_Finalizeequalization		
			Communicator , MPI_Comm_size and MPI_Comm_rank		
20-24	30 Theoretical 30 practical	The student should be able to understand the main roles of MPI functions as sending, recv and performance evaluation.	MPI_Send MPI_Recv	A theoretical presentation using illustrative diagrams + applied practical lectures + seminars	Achievement test + discussion and question + class assignment
			Performance evaluation of MPI program - taking trimming - results - speedup and efficiency - scalability		
			Process, thread, and Pthreads - Hello, world -Execution -Preliminaries -Starting the thread		
			- Starting the thread - Running the thread - Stopping the thread		
			- Error checking		
			- Other approaches to thread start up		
25	6 Theoretical 6 practical	The student should be able to apply the methods used to Parallelizing tree search	Read-write locks Parallelizing tree search	A theoretical presentation using illustrative diagrams +	Achievement test + discussion

				applied practical lectures + seminars	and question + class assignment
26-28	18 Theoretical 18 practical	The student should be able to apply the tree searching.	Tree search	A theoretical presentation using illustrative diagrams + applied practical lectures + seminars	Achievement test + discussion and question + class assignment
			• Recursive depth first search		
			Performance of the implementation		
			Implementation of tree search and static partitioning		
			Implementation of tree search and dynamic partitioning		
			Non recursive depth first search		
29	6 Theoretical 6 practical	The student should be able to understand OpenMP	OpenMP introduction	A theoretical presentation using illustrative diagrams + applied practical lectures + seminars	Achievement test + discussion and question + class assignment
30	6 Theoretical 6 practical	The student should be able to understand parallel processing paradigm	Revision and Preparatory Week	A theoretical presentation using illustrative diagrams + applied practical lectures + seminars	Achievement test + discussion and question + class assignment
11. Course evaluation					

Distributing the course out of 100:

- 20% for monthly and daily exam grades for the first semester.
- 10% for the midterm exam.
- 20% for monthly and daily exam grades for the second semester.
- 50% for final exam scores.

12. Learning and teaching resources

- [1] Peter S. Pacheco, “An introduction to parallel Programming”, Morgan Kaufmann, 2011.
- [2] C Lin, L Snyder. Principles of Parallel Programming. USA: Addison-Wesley Publishing Company, 2008.
- [3] A Grama, A Gupta, G Karypis, V Kumar. Introduction to Parallel Computing (2nd ed.). Addison Wesley, 2003.
- [4] M. J. Quinn, “Parallel programming in C with MPI and OpenMP”, Tata McGraw Hill, 2003.