Course Name: **Parallel and Distributed Computing**		
Course Code: COMP 410	**Course Type (major)**	**Course Credits: 3**
Class Timings: T R 3:30 - 4:45 pm	**Section: A**	**Student Meeting Hours/ Office Hours:** (Monday, Wednesday 12 pm – 2 pm, Tuesday 11:30 am -12:30 pm, 2 – 3 pm)
Instructor Name: Sharoon Nasim		
Instructor Contact Details Email: sharoonnasim@fccollege.edu.pk Other: Office Hours: (Monday, Wednesday 12 pm – 2 pm, Tuesday 11:30 am -12:30 pm, 2 – 3 pm) Guidelines for contacting instructor: **Email before visiting office.**		
TA Name and Contact Details (if applicable): Name: Email: Other: Office Hours: Guidelines for contacting TA/s:		
Course Description: Pre-requisites if any: COMP 301 The course will cover a selection of topics in constructing, testing, and performance evaluation of parallel and distributed applications. Various implementation techniques, paradigms, architectures, and programming languages will be discussed including: MPI, OpenMP, GPU, concurrency, and multi-threading.		
Main Mode of Instruction: *On-Campus Classes* **Technology Requirements** *Laptop, and access to Internet* **Technology Etiquettes** Use only authorized resources. **Considerations for Students with Limited Internet/Technology Access:**		
Lab Resources (if relevant): No Labs		
Course Objectives or Student Learning Outcomes (SLOs) This course covers a broad range of topics related to parallel and distributed computing, including parallel and distributed architectures and programming paradigms of parallel and distributed systems. The basic goal of this course is to understand the fundamental concepts of parallel and distributed computing, analyze different problems and develop programming solutions with a parallel programming approach.		

Course Content, Learning Material & Activities Schedule

The schedule is tentative.

No	Topic Title	Activities
1	**Course Introduction** **Introduction to Parallel and distributed systems** **Motivating parallelism (evolution, need, and future)**	
2	**Scope of Parallel computing in commercial, scientific, and engineering and design applications, Scalability issues, Amdahl's law**	
3	**Fynn's Taxonomy, Multithreading**	
4	**Superscalar processors, Network topologies for parallel architectures**	
5	**Shared Memory architecture, Processor to memory connection strategies**	
6	**Evaluating static interconnections In-terms of diameter. arc-connectivity. bisection width, and cost Cut-through Routing and Cost- performance tradeoffs**	
7	**Principles of parallel algorithm design decomposition. Tasks, Dependency Graphs. Granularity, Concurrency**	
8	**Decomposition Techniques, Parallel Algorithm models**	
9	**Programming Shared Address Space Platforms using POSIX Thread API and OpenMP (Thread Basics, Motivation. Synchronization Primitives)**	
10	**Shared memory programming with OpenMP/ Python**	
11	**Parallel programming with OpenMP, work sharing constructs**	
12	**Synchronization Constructs in OpenMP, OpenMP Library Functions, Environment variables**	
13	**Introduction to distributed Systems, Types of Distributed System Architectures** **Distributed Operating Systems**	

14	**Types of Distributed Systems.** • **Cluster Computing** • **Grid Computing** • **Cloud Computing** • **Utility Computing**	
15	**Basic Communication Operations (Broadcast. Reduction, Scatter, Gather, and Circular Shift**	
16	**Parallel Cost analysis for the operations over Ring, 2D-Mesh, Hypercube, and 3d-cube**	
17	**Programming Distributed machines using Message Passing Interface (MPI)**	
18	**Collective Communication and Computation Operations: Barrier, Broadcast, reduction**	
19	**Collective Communication and Computation Operations: prefix, Gather, scatter, All-to-All**	
20	**Fault Tolerance Techniques: Hardware Redundancy**	
21	**Fault Tolerance Techniques: Information and Time Redundancy**	
22	**Revision and Project Evaluation**	

Textbooks, Materials, Supplies, and other Resources

- Introduction to Parallel Computing, Second Edition-Ananth Grama, Anshul Gupta
- Distributed Systems Concepts and Design – 5th Edition
- Using OpenMP: Portable Shared Memory Parallel Programming by Barbara Chapman
- Distributed Systems (Principle and Paradigms) A S. Tanenbaum, M V Steen
- Distributed Computing with python by Francesco Pierfederici
- Distributed and cloud computing: clusters, grids, clouds, and the future internet. Authors: Kai Hwang, J. J. Dongarra, Geoffrey C. Fox.

Course Assessment Instruments (Tentative):

The breakup is as follows:

Attendance	5%
Class Participation	5%
Assignments/ Project	15%
Quizzes:	15%
Midterm exam:	25%
Final term exam:	35%
TOTAL	**100%**

NOTE:

- All assignments are due before 11:59 p.m. on the due date. Students can be called to appear for viva at random as and when needed to determine their knowledge gained.
- There will be NO retake for the quiz and assignments unless previous accommodations have been made with the course instructor.
- Students are advised to attend all lectures, but 75% attendance is compulsory. It is entirely the student's responsibility to recover any information or announcements presented in lectures from which they were absent.
- All work that you submit in this course must be your own.
- Unauthorized group efforts are considered academic dishonesty.
- You may discuss assignments in a general way with others, but you may not consult anyone else's written work. You are guilty of academic dishonesty if:
    - You examine another's solution to an assignment/Quiz/Project/exam
    - You allow another student to examine your solution to an assignment/Quiz/Project/ Lab Work or any exam
    - You fail to take reasonable care to prevent another student from examining your solution and that student does examine your solution.

In case of unauthorized group efforts, academic dishonesty/fraud, cheating and plagiarism following policy is applicable (All cases of breach of Academic Integrity will be reported to Vice Rectors office/AIC)
This course has ZERO TOLERANCE POLICY on any academic Integrity breach

- For Mid, Final, Assignments, Quizzes.

Cheating or violation of academic integrity in any exam/project will cause F grade in course

Grading Legend

Below is the grading legend of FCCU (published in all catalogs and available on the FCCU website) as approved by the Academic Council

Grade	Point Value	Numerical Value	Meaning
A	4.00	93-100	Superior
A-	3.70	90-92	
B+	3.30	87-89	Good
B	3.00	83-86	
B-	2.70	80-82	
C+	2.30	77-79	Satisfactory
C	2.00	73-76	
C-	1.70	70-72	
D+	1.30	67-69	Passing
D	1.00	60-66	

F	0.00	59 or below	Failing

Student Conduct & Other Issues:
- Consider including ground rules for appropriate classroom interactions, as well as a clear statement of expectations that classroom interactions will remain civil, respectful, and supportive.
- If any student faces any issues or has any concerns regarding the classroom climate and interactions, please feel free to contact VR office ___ gloriacalib@fccollege.edu.pk

Changes to the Syllabus:
This syllabus was designed to convey course information and requirements as accurately as possible. It is important to note however that it **may** be subject to change during the course depending on the needs of the class and other situational factors. Such changes would be for your benefit and you will be notified of them as soon as possible.

Student Support Services

Student Counseling Services. Students can contact the Campus Counseling Center at 0331-444-1518 or email ccc@fccollege.edu.pk.

Writing Center
Mercy Health Center

Other Useful FCCU Policy Documents:

Sexual Harassment Policy
Anti-Corruption Policy
Academic integrity
Plagiarism Policy
Academic Calendar