IISER
THIRUVANANTHAPURAM

भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान तिरुवनंतपुरम

Indian Institute of Science Education and Research Thiruvananthapuram

Course Information Handout

1. Course Name : ***Computer Organization and Operating Systems***
2. Course Code(s) : ***DSC 315***
3. Semester and Year : ***Semester 4, 2025-26***
4. Instructor(s) : ***Dr. Laltu Sardar***
5. Lecture Plan

Sl. No.	Modules/Contents	No. of Hour(s)[1]
1	Computer abstraction and technology: Basic principles, hardware components, Measuring performance: evaluating, comparing and summarizing performance. Instructions: operations and operands of the computer hardware, representing instructions, making decision, supporting procedures, character manipulation, styles of addressing, starting a program.	5
2	Computer Arithmetic: signed and unsigned numbers, addition and subtraction, logical operations, constructing an ALU, multiplication and division, floating point representation and arithmetic, Parallelism and computer arithmetic.	4
3	The processor: building a data path, simple and multi-cycle implementations, microprogramming, exceptions, Pipelining, pipeline Data path and Control, Hazards in pipelined processors	4
4	Memory hierarchy: caches, cache performance, virtual memory, common framework for memory hierarchies Input/output: I/O performance measures, types and characteristics of I/O devices, buses, interfaces in I/O devices, design of an I/O system, parallelism and I/O. Introduction to multicores and multiprocessors.	5
5	Operating system overview: Computer System Organization, Operating System structure, operations of OS, process management, memory management, storage management, protection and security, distributed systems.	2
6	Processes: Process concept, Process scheduling, Operations on processes, Cooperating processes, inter-process communication	3
7	Threads: Overview, Multi-threading models, threading issues, P threads, Windows XP threads	3
8	CPU Scheduling: Basic concepts, scheduling criteria, scheduling algorithms, multiple-processor scheduling	3
9	Process synchronization: The critical section problem, Peterson's solution, synchronization hardware, Semaphores, Monitors. Synchronization examples	2

[1] Assume 1 lecture = 50-60 minutes for calculating number of hours for each topic.

10	Deadlocks: Methods for handling deadlocks, Deadlock prevention, deadlock avoidance, Deadlock recovery	1
11	Memory management: Swapping, Paging, Segmentation, Virtual memory, Demand paging, Page replacement	4
12	I/O Systems: I/O hardware, Application I/O interface, Kernel I/O subsystem, transforming I/O requests to hardware operations	4
	TOTAL NUMBER OF HOURS[2]	**40**

6. Reference Books

a. D. A. Pattersen and J. L. Hennesy, *Computer Organisation and Design: The Hardware/ Software Interface*, 4th ed., Morgan Kaufman, 2009

b. William Stallings. 1999. *Computer Organization and Architecture: Designing for Performance* (5th. ed.). Prentice Hall PTR, USA.

c. William Stallings. 2011. *Operating Systems: Internals and Design Principles* (7th. ed.). Prentice Hall Press, USA.

d. Abraham Silberschatz, Peter B. Galvin, and Greg Gagne. 2012. *Operating System Concepts* (9th. ed.). Wiley Publishing

7. Grading Scheme

Sl. No.	Type of Exam(s)	Marks
1	Internal Assessment (Quiz +Assignments)	20
2	Mid Semester Examinations	30
3	End Semester Examinations	50
	Total	**100**

[2] Three-credit courses should have 40 ± 2 hours, Two-credit courses, 27±1 hours and One-credit courses, 14±1 hours