# 19CS2103 - OPERATING SYSTEMS

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| **Course Category:** | Program Core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3-0-0 |
| **Prerequisite:** | Knowledge about fundamentals of computer basics | **Sessional Evaluation:**  **Univ. Exam Evaluation:**  **Total Marks:** | 40  60  100 |
| **Objectives** | * Learn OS operations and supporting structures. * Knowledge about the different scheduling algorithms and their evaluation. * Obtain exposure on deadlock handling, protection and security mechanisms | | |

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| **Course Outcomes** | Upon successful completion of the course, the students will be able to: | |
| CO1 | Learn the Basics of Operating Systems and structures. |
| CO2 | Acquire knowledge about Inter process communication and scheduling algorithms. |
| CO3 | Study Deadlock handling mechanisms. |
| CO4 | Understand various Memory management techniques. |
| CO5 | Gain insights of File system operations and implementation methods. |
| CO6 | Identify Disk Structures and various goals and principles of protection. |
| **Course Content** | UNIT-I  **Introduction:** What Operating Systems Do, OS Structure & Operations, Process Management, Memory and Storage Management, Protection and Security, Computing Environments, Open-Source Operating Systems.  **System Structures:** OS Services, User & OS Interface, System Calls, Types of System Calls, System Programs, OS Design and Implementation, Various structures of OS, OS Debugging, System Boot.  UNIT-II  **Process Management:** Process Concept, Process Control Block, Process Scheduling, Operations on Processes, Interprocess Communication, Examples of IPC systems.  **Process Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.  UNIT-III  **Synchronization:** The Critical-Section Problem, Peterson’s Solution, Mutex Locks, Semaphores, Classic Problems of Synchronization - Reader/Writers Problem, Dining – Philosophers Problem, Monitors.  **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.  UNIT-IV  **Memory Management Strategies:** Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.  **Virtual Memory Management:** Background, Demand Paging, Copy on write, Page replacement, Frame allocation, Thrashing, Allocating Kernel Memory.  UNIT-V  **File System:** File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.  **Implementing File-System:** File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, and Recovery.  UNIT-VI  **Mass Storage Structure:** Overview, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, RAID Levels, Stable-Storage Implementation.  **System Protection and Security:** Goals, Principles and Domain of protection, Security Problem, Program Threats, System and Network Threats. | |
| **Text Books and References:** | Text Books:   1. “Operating System Concepts”, Abraham Silberchatz, Peter B Galvin, Greg Gagne, 9th Edition, John Wiley & Sons Publication, 2016. | |
| Reference Books:   1. “Modern Operating Systems”, Andrew S. Tanenbaum, Herbert Bos, 4th Edition, Pearson Education, 2016. 2. “Operating Systems – Internals and Design Principles”, William Stallings, 9th Edition, Pearson Education, 2018. 3. “Operating System: A Design-oriented Approach”, Charles Crowley, 1st Edition TMH Publication, 2017. | |
| **E-Resources** | 1. <https://nptel.ac.in/courses> 2. <https://freevideolectures.com/university/iitm> | |