# 20CS2202 - 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, 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, 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 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.  **System Protection and Security:** Goals, Principles and Domain of protection, Security Problem, Program Threats, System and Network Threats. | |
| Text Books &  References  Books | **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> | |

**CO-PO Mapping:** 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 2 | - | 2 | - | - | - | 1 | 3 | - | - | - | 2 |
| **CO2** | - | - | - | 2 | 1 | - | - | - | - | - | - | 3 |
| **CO3** | - | - | 3 | 1 | 3 | - | - | - | - | - | - | 2 |
| **CO4** | - | - | 3 | 3 | 1 | - | - | - | - | 2 | - | 2 |
| **CO5** | - | 3 | - | 2 | - | 3 | - | - | 3 | - | - | 2 |
| **CO6** | - | - | - | 3 | 3 | - | - | - | - | 3 | 3 | 2 |