

# Course Title: Operating Systems Credit Units: 04

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| **L** | **T** | **P/ S** | **SW/F W** | **TOTAL**  **CREDIT UNITS** |
| 3 | - | 2 | 0 | 4 |

**Course Level:** UG

**Course Code: CSE202**

# Course Objectives:

After successfully completing the course, students will be able to Provides insight to Operating general purpose computers, Overcome challenges they face in real world use of computers. Understand how memory is managed. In different Operating Systems, Understands the characteristics, on which choice of Operating Systems depends, understand how files and processes are managed on a computer.

**Pre-requisites:** Basic Knowledge of Introduction to Computer and Programming in C.

# Course Contents/Syllabus:

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| --- | --- |
|  | **Weightage (%)** |
| **Module I: Introduction to operating system:** | **15** |
| Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing  and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls. |

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| **Module II: Process Management** | **25** |
| Process concept, State model, process scheduling, job and process synchronization, structure of process  management, Threads.  Interprocess Communication and Synchronization: Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication.  CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling.  Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach. |
| **Module III :Memory Management** | **25** |
| Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging,  Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays |
| **Module IV : Device management** | **15** |
| Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory,  Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling, |
| **Module V: File System and Protection and security** | **20** |
| File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing,  Allocation method, Free space management. Policy Mechanism, Authentication, Internal excess Authorization. |

**Course Learning Outcomes: After completion of this course student will be able to**

* learn basic concepts and responsibilities of operating system
* Design, and implement various CPU scheduling, deadlocks and synchronization algorithm.
* Discuss, restate, and apply concepts of memory management
* Analyze and evaluate various I/O component of computing system
* Identify and demonstrate different storage management techniques and protection policies

# Pedagogy for Course Delivery:

* The class will be taught using online teaching covering theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques.

# LAB

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1. Use of Basic UNIX Shell Commands/Linux Commands.
2. Commands related to inode, I/O redirection and piping, process control commands, mails
3. Shell Programming: Shell script exercises based on following:
4. Interactive shell scripts
5. (ii) Positional parameters
6. Arithmetic
7. if-then-fi, if-then- else-fi, nested if-else
8. Logical operators
9. else + if equals elif, case structure
10. while, until, for loops, use of break
11. Write a shell script that accept a file name starting and ending line numbers as arguments and display all the lines between given line no.
12. Write a shell script that delete all lines containing a specified word.
13. Write a shell script that displays a list of all the files in the current directory
14. Simulation of Unix commands using C.
15. Implement the following CPU Scheduling Algorithms. i) FCFS ii) Shortest Job First.
16. Implement the following CPU Scheduling Algorithms. i) Round Robin ii) priority based

# List of Open-Ended Program

1. Write a script which will shows all running process on your linux system boots up.
2. WAP to generate maximum number of child process in your system and with the help of program explain what are Zombie process.
3. WAP for your own Signal Handler which will execute when you type CTRL+D

# Assessment/ Examination Scheme:

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| --- | --- | --- |
| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **Total** |
| **75** | **25** | **100** |

**B.Tech Theory Assessment (L&T):**

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Continuous Assessment/Internal Assessment 40%** | | | | | **End Term Examination 60%** | |
| **Components (Drop down)** | Attendance | Class Test | Assignment | Quiz | **EE** | |
| **Weightage (%)** | 5 | 15 | 10 | 10 | 60 | |

**Lab/ Practical/ Studio Assessment:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Continuous Assessment/Internal Assessment 40%** | | | | | **End Term Examination 60%** | |
| Components (Drop down | Performance | Lab Record | Viva | Attendance | Practical | viva |
| Weightage (%) | 10 | 15 | 10 | **5** | **30** | **30** |

# Text & References:

**Text Books:**

* 1. Milenekovic, “Operating System Concepts”, McGraw Hill
  2. A. Silberschatz, P.B. Galvin “Operating System Concepts”, John Willey & son

# Reference Books:

1. Tannenbaum, “Operating system design and implementation”, PHI
2. Willam Stalling “ Operating system” Pearson Education
3. B. W. Kernighan & R. Pike, “The UNIX Programming Environment” Prentice Hall of India, 2000
4. Sumitabha Das “ Your UNIX The ultimate guide” Tata Mcgraw Hill
5. YashwantKantikar, “Shell Programming”, PBP Publication.