

**Department of Computer Science & Design**

**COURSE MODULE FOR THE SESSION 2024(ODD SEMESTER)**

## Course Syllabus with CO's

| Academic Year: 2024                   |                   |               |  |               |   |   |                        |
|---------------------------------------|-------------------|---------------|--|---------------|---|---|------------------------|
| Department: Computer Science & Design |                   |               |  |               |   |   |                        |
| Course Code                           | Course Title      | Core/Elective | Prerequisite                                   | Contact Hours |   |   | Total Hrs/<br>Sessions |
|                                       |                   |               |  | L             | T | P |                        |
| BCS303                                | Operating Systems | Core          | Fundamentals of computer hardware and software | 3             | - | 2 | 40                     |

**Objectives:**

- Introduce concepts and terminology used in OS
- Explain threading and multithreaded systems
- Illustrate process synchronization and concept of Deadlock.
- Introduce Memory and Virtual memory management, File system and storage techniques

**Topics Covered as per Syllabus**

**Module -1**

**Introduction to operating systems, System structures:** What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments.

**Operating System Services:** User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System debugging, Operating System generation; System boot.

**Module -2**

**Process Management:** Process concept; Process scheduling; Operations on processes; Inter process communication

**Multi-threaded Programming:** Overview; Multithreading models; Thread Libraries; Threading issues.

**Process Scheduling:** Basic concepts; Scheduling Criteria; Scheduling Algorithms; Thread scheduling; Multiple-processor scheduling,

**Module -3**

**Process Synchronization:** Synchronization: The critical section problem; Peterson’s solution; Synchronization hardware; Semaphores; Classical problems of synchronization;

**Deadlocks:** System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

**Module -4**

**Memory Management:** Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.

**Virtual Memory Management:** Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames

|  |
|--|
| <b>Module -5</b><br><b>File System, Implementation of File System:</b> File system: File concept; Access methods; Directory and Disk structure; File system mounting;<br><b>File sharing; Implementing File system:</b> File system structure; File system implementation; Directory implementation; Allocation methods; Free space management. Secondary Storage Structure,<br><b>Protection:</b> Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix. |
| <b>Textbooks:</b>  |
| 1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 8th edition, Wiley-India, 2015   |
| <b>Reference Books</b>   |
| 1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition 2<br>2. D.M Dhamdhare, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.<br>3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI(EEE), 2014.   |
| List of URL's  |
| 1. <a href="https://youtu.be/mXw9ruZaxzQ">https://youtu.be/mXw9ruZaxzQ</a><br>2. <a href="https://youtu.be/vBURTt97EkA">https://youtu.be/vBURTt97EkA</a> 3.<br>3. <a href="https://www.youtube.com/watch?v=783KABtuE4&amp;list=PLIemF3uozcAKTgsCIj82voMK3TMR0YE_f">https://www.youtube.com/watch?v=783KABtuE4&amp;list=PLIemF3uozcAKTgsCIj82voMK3TMR0YE_f</a>  |
| <b>Course outcomes:</b> The students should be able to:  |
| <ul style="list-style-type: none"> <li>• Demonstrate need for OS and different types of OS</li> <li>• Apply suitable techniques for management of different resources</li> <li>• Use processor, memory, storage and file system commands</li> <li>• Realize the different concepts of OS in platform of usage through case studies</li> </ul>  |
| <b>Internal Assessment Marks: 40 (3 Session Tests are conducted during the semester and Marks allotted based on average of all performances).</b>  |

**The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)**

| Subject Code            | BCS303 |     |     |     | Title: Operating Systems |     |     |     |     |      |      |      |       |
|-------------------------|--------|-----|-----|-----|--------------------------|-----|-----|-----|-----|------|------|------|-------|
| List of Course Outcomes | PO 1   | PO2 | PO3 | PO4 | PO5                      | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | Total |
| CO-1                    | 3      | 2   | 2   | -   | -                        | -   | -   | -   | -   | -    | -    | -    | 7     |
| CO-2                    | 3      | 2   | 2   | -   | -                        | -   | -   | -   | -   | -    | -    | -    | 7     |
| CO-3                    | 3      | 2   | 2   | -   | -                        | -   | -   | -   | -   | -    | -    | -    | 7     |
| CO-4                    | 3      | 2   | 2   | -   | -                        | -   | -   | -   | -   | -    | -    | -    | 7     |
| <b>Total</b>            | 12     | 8   | 8   | -   | -                        | -   | -   | -   | -   | -    | -    | -    | 28    |

**The Correlation of Program Specific Outcome's (PS0's) and Course Outcome (CO's)**

| Subject Code             | BCS303 | Title: Operating Systems |       |
|--------------------------|--------|--------------------------|-------|
| List of Course Outcome's | PSO1   | PSO2                     | Total |
| CO-1                     | -      | -                        | -     |
| CO-2                     | -      | -                        | -     |
| CO-3                     | -      | -                        | -     |
| CO-4                     | -      | -                        | -     |
| <b>Total</b>             | -      | -                        | -     |

**Note:** 3 = Strong Contribution    2 = Average Contribution    1= Weak Contribution    - = No Contribution

