**Course Name:** Operating Systems
**Course Code:** T7998
**Faculty:** Engineering
**Course Credit:** 4
**Course Level:** 2
**Sub-Committee (Specialization):** Computer Science
**Learning Objectives:**

The students are able to:
Demonstrate the understanding of fundamental Operating Systems concepts.
Understand the concept of process and thread management and apply the CPU scheduling algorithm to solve problems.
Explain and apply the concept of process synchronization, mutual exclusion and the deadlock.
Discuss various memory management techniques and apply memory page replacement algorithms to solve problems.
Understanding of the concepts of file management by Operating System.
Discuss the management of I/O devices by Operating System.

**Books Recommended:**

| Book | Author | Publisher |
|---|---|---|
| Modern Operating System, 4th Edition. | Andrew S. Tanenbaum & Herbert Bos | Pearson, ISBN-13: 9780133592221 |
| Operating System Concepts, 9th Edition. | Abraham Silberschatz, Peter Baer Galvin and Greg Gagne | WILEY, ISBN 978-1-118-06333-0 |
| Operating System: Internals and Design Principles, 8th Edition. | William Stallings | Prentice Hall, ISBN-10: 0-13-380591-3, ISBN-13: 978-0-13-380591-8 |
| Operating Systems, 2nd Edition, October 2005 | A Godbole | by Tata Mc Graw Hill, ISBN: 9780070591134. |
| The Design of the Unix Operating System,1st Edition | Maurice J. Bach | Prentice Hall ISBN: 0-13-201799-7. |

**Course Outline:**

| Sr. No. | Topic | Actual Teaching Hours | Contact Hours Equivalence |
|---|---|---|---|
| 1 | **Introduction to Operating System:**<br>Introduction and need of an operating system<br>evolution of operating system<br>layered architecture/logical structure of an operating system<br>OS services<br>type of OS<br>introduction to UNIX OS | **10** | **10** |
| 2 | **Processes and Process Management:**<br>Process concept and process states<br>CPU and I/O bound<br>operating system services for process and thread management | **10** | **10** |

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| | CPU scheduler- short, medium, long-term, dispatcher<br>scheduling: - preemptive and non-preemptive<br>scheduling algorithms- FCFS, SJFS,<br>shortest remaining time<br>RR<br>priority scheduling<br>Multilevel feedback queue. | | |
| 3 | **Inter-process Communication and Synchronization, Deadlocks:**<br>Introduction to message passing<br>race condition<br>critical section problem<br>mutual exclusion with busy waiting- disabling interrupts<br>lock variables<br>Peterson's solution<br>TSL instructions<br>busy waiting<br>sleep and wake up calls<br>semaphore<br>monitors<br>classical epic problems<br>Deadlock- system model<br>resource types<br>deadlock problem<br>deadlock characterization<br>methods for deadlock handling<br>deadlock prevention<br>deadlock avoidance<br>deadlock detection<br>recovery from deadlock | **12** | **12** |
| 4 | **Memory Management:**<br>Basic hardware and issues<br>logical and physical address space<br>address binding types: contiguous and non-contiguous<br>paging -concept<br>TLB translation look aside buffer<br>inverted page table<br>segmentation<br>virtual memory<br>management of virtual memory: allocation<br>fetch<br>page replacement policies | **12** | **12** |
| 5 | **File System:**<br>Concepts<br>attributes<br>operations<br>types<br>structure<br>file organization & access methods<br>memory mapped files<br>directory structures one level<br>two levels<br>hierarchical/tree<br>acyclic graph<br>general graph<br>file system mounting | **8** | **8** |

| | | | |
|---|---|---|---|
| | file sharing<br>path name<br>directory operations | | |
| 6 | **I/O Systems:**<br>Disk structure & operations<br>disk attachment<br>disk storage capacity<br>disk scheduling algorithm- FCFS, SSTF<br>scan scheduling<br>C-scan schedule | **8** | **8** |
| | **Total** | **60** | **60** |

**Pre Requisites:**

None.

**Evaluation:**

Assignment
Seminar
Quiz
Examination

**Pedagogy:**

Classroom teaching
Buddy session
Worksheets
Seminar

**Expert:**

Amit C. Kale,NA,NA