

**DEPARTMENT OF COMPUTER APPLICATIONS**  
**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

COURSE PLAN – PART I			
Name of the programme and specialization	Master of Computer Applications		
Course Title	Operating Systems		
Course Code	CA714	No. of Credits	3
Course Code of Pre-requisite subject(s)	CA715		
Session	January 2022	Section (if, applicable)	A
Name of Faculty	Dr. Selvakumar K	Department	Computer Applications
Email	kselvakumar@nitt.edu	Telephone No.	0431-2503733
Name of PAC Chairman	Dr. B. Janet		
E-mail	janet@nitt.edu	Telephone No.	0431-2503741
Course Type	Core course		
<b>Syllabus (approved in BoS)</b>			
<p><b>Module 1:</b>            Operating System concept- OS Structure Services-System calls Process management- Process Concept-Operations on process-Cooperating processes- Inter-process communication-Process scheduling-Scheduling algorithms-Threads- Multithreading models.</p> <p><b>Module 2:</b>            Process synchronization- critical-section problem Synchronization hardware Semaphores Classic problems of synchronization critical regions Monitors Deadlock-Deadlock characterization Methods for handling deadlocks Recovery from deadlock.</p> <p><b>Module 3:</b>            Memory management-Buddy system-Paging-segmentation-Virtual Memory Demand paging- Page replacement algorithms Allocation of frames Thrashing-Working set model.</p> <p><b>Module 4:</b>            Files and Directories - Files System structure- Implementation File allocation methods- Free space management- Virtualization Containers.</p>			

**Module 5:**

I/O systems I/O interface Kernel I/O subsystem. Disk scheduling algorithms- Disk management-Swap space management.

**Module 6:**

Protection and security -Case Study-Linux, Windows, Mac OS and Mobile OS.

**REFERENCES:**

1. Silberschatz, Galvin and Gagne, "Operating System Concepts", 9th Edition, Jhon Wiley & Sons Inc, 2013.
2. Andrew S. Tanenbaum, Modern Operating Systems, 4th Edition, Prentice-Hall of India, 2015.
3. SibsankarHaldar, Alex A.Aravind, Operating systems, Pearson Education, 2009.

**COURSE OBJECTIVE(S)**

To introduce basic concepts and features of OS with a case study on different operating systems

**COURSE OUTCOMES (CO)**

Course Outcomes	Aligned Programme Outcomes (PO)
Students will be able to:	
1. Use systems calls for managing processes, memory, and the file systems	I, II, III,IV
2. Be familiar with various types of operating system structures for examples Linux, Windows, Mac OS and Mobile OS.	I, II, III,IV, V, VII, IX
3. Explore the functionalities of the operating systems with numerical examples.	I, II, III,IV, V, VII, IX, X, XII

**COURSE PLAN – PART II****COURSE OVERVIEW**

This subject introduces the functionality of an Operating System, the issues in the design of an OS, Different approaches to create the OS, and more importantly the abstraction of all underlying systems. Also, it conveys the System calls, their interfaces, API's are introduced in this module. The important isolation via the use of kernel and user modes is introduced. The module also covers processes, threads and how they are managed. Scheduling of processes, the algorithms for the same, design decisions to pre-empt or not a running process are important concepts discussed. Deadlocks, when processes try to access shared resources & mechanisms to break and avoid deadlocks, are discussed. Moreover, Main Memory, its hierarchy, use of caches are introduced in this module. The

need for virtual memory concepts, TLB hardware, and the use of pages and management of the pages are highlights of the topics discussed. Finally, Important concepts of security of the OS, its protection, policies for the same, authentication models is introduced in this module. OS performance measurements and related issues are discussed.

**COURSE TEACHING AND LEARNING ACTIVITIES**

S.No.	Week/ Contact Hours	Topic	Mode of Delivery
1	Week 1 (3 Classes)	Class I: Introduction to OS	MS Teams, PPT, Khami Graph Editor
		Class II: Operating System concept	
		Class III: OS Structure Services-System calls	
2	Week 2 (3 Classes)	Class I: Process management	MS Teams, PPT, Khami Graph Editor
		Class II: Operations on process-Cooperating processes	
		Class III: Process Concept	
3	Week 3 (3 Classes)	Class I: Inter-process communication	MS Teams, PPT, Khami Graph Editor
		Class II: Process scheduling	
		Class III Scheduling algorithms	
4	Week 4 (3 Classes)	Class I: Threads	MS Teams, PPT, Khami Graph Editor
		Class II: Multithreading models	
		Class III: Process synchronization- critical-section problem	
5	Week 5 (3 Classes)	Class I: Synchronization hardware Semaphores	MS Teams, PPT, Khami Graph Editor
		Class II: Classic problems of synchronization critical regions	
		Class III Monitors	
6	Week 6 (3 Classes)	Class I: Deadlock- Deadlock characterization	MS Teams, PPT, Khami Graph Editor
		Class II: Methods for handling deadlocks	
		Class III: Recovery from deadlock	
7	Week 7 (3 Classes)	Class I: Memory management-Buddy system	MS Teams, PPT, Khami Graph Editor
		Class II: Paging-segmentation-Virtual Memory Demand paging	
		Class III: Page replacement algorithms Allocation of frames	
8	Week 8 (3 Classes)	Class I: Thrashing-Working set model	MS Teams, PPT, Khami Graph Editor
		Class II: Files and Directories	
		Class III: Files System structure	
9	Week 9 (3 Classes)	Class I: Implementation File allocation methods	MS Teams, PPT, Khami Graph Editor
		Class II: Free space management	
		Class III: Virtualization Containers	
10	Week 10 (3 Classes)	Class I: I/O systems	MS Teams, PPT, Khami Graph Editor
		Class II: I/O interface	
		Class III: Kernel I/O subsystem	

11	Week 11 (3 Classes)	Class I: Disk scheduling algorithms	MS Teams, PPT, Khami Graph Editor
		Class II: - Disk management	
		Class III: Swap space management.	
12	Week 12 (3 Classes)	Class I: Protection and security	MS Teams, PPT, Khami Graph Editor
		Class II: -Case Study-Linux, Windows	
		Class III: , Mac OS and Mobile OS	

#### **COURSE ASSESSMENT METHODS**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test 1	As per Academic Schedule	1 hr	25
2	Cycle Test 2		1 hr	25
3	Assignment	4 <sup>th</sup> Week, 7 <sup>th</sup> Week, and 9 <sup>th</sup> week	-	20
4	Compensation Assessment	As per Academic Schedule	1 hr	25
5	Final Assessment		2 hrs	30

**ATTENDANCE POLICY** (A uniform attendance policy as specified below shall be followed)

- **At least 75% attendance in each course is mandatory.**
- Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

#### **COMPENSATION ASSESSMENT**

- One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.

#### **ACADEMIC DISHONESTY & PLAGIARISM**

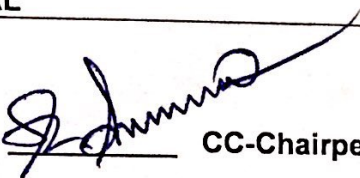
- Zero marks to be awarded for the offenders. For copying from another student, both students get the same penalty of zero marks.
  - The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall apply to all the programmes.

#### **ADDITIONAL INFORMATION**

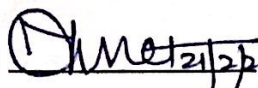
**NIL**

FOR APPROVAL

Course Faculty



CC-Chairperson



HOD

