1. Title of subject	Operating Systems
2. Subject code	TOS 2461
3. Status of subject	Core Subject
4. Credit Hour	3 28 Hours of Lecture 14 Hours of Tutorial LAN's Credit Hours Equivalent : 2.67
5. Semester	Trimester 1 (Gamma level)
6. Pre-Requisite	None
7. Methods of teaching	28 Hours of Lecture 14 Hours of Tutorial
8. Assessment	40% Coursework - 20% Assignment - 20% Mid-Term Exam 60% Final Exam **Total 100%**
9. Teaching staff (Proposed)	Mr. Asrul Hadi Mr. Jayakumar
10. Objective of subject	To introduce the main components of a typical operating system and the services that is provides.
11. Synopsis of subject	This subject deals with the important aspects of a computer operating system, including processes, scheduling algorithms, and memory management. Concepts such as deadlocks, memory management, and file management are detailed.
	Kursus ini menerangkan fungsi sistem operasi di dalam menguruskan perisian komputer.

<table>
<tr><td>12. Learning Outcomes</td><td colspan="2">By the end of the subject, the students should be able to :-
• Identify the basic component of Operating System (e.g., Memory, I/O, Process, File Management)
• Compare and contrast data storage hierarchy, memory management, processor allocation strategies, user interface across different operating systems.
• Demonstrate skill in analyzing a specific problem likely to occur in a component of an operating system (e.g., file structures, and shell programming).</td></tr>
<tr><td rowspan="8"></td><td>Programmes Outcomes</td><td>Degree of Contribution (%)</td></tr>
<tr><td>• Ability to
apply soft skills in work and career related activities</td><td>5</td></tr>
<tr><td>• Good understanding of fundamental concepts</td><td>40</td></tr>
<tr><td>• Acquisition and mastery of knowledge in specialized area</td><td>20</td></tr>
<tr><td>• Acquisition of analytical capabilities and problem solving skills</td><td>20</td></tr>
<tr><td>• Adaptability and passion for learning</td><td>5</td></tr>
<tr><td>• Cultivation of innovative mind and development of entrepreneurial
skills</td><td>5</td></tr>
<tr><td>• Understanding of the responsibility with moral and professional ethics</td><td>5</td></tr>
<tr><td>13. Details of subject</td><td>Topics Covered</td><td>Hours</td></tr>
<tr><td></td><td>1. Introduction to Operating Systems

Early systems, simple batch systems, multiprogrammed batch systems, time-sharing systems, personal-computer systems, parallel systems, distributed systems, real-time systems.</td><td>4</td></tr>
<tr><td></td><td>2. Computer System Structures

Computer systems operation, I/O structure, storage structure, storage hierarchy, hardware protection, general system architecture.</td><td>2</td></tr>
</table>

	3. Operating System Structures System components, operating system services, system calls, system programs, system structure, virtual machines, system design and implementation, system generation.	2
	4. Processes Process concept, process scheduling, operation on a process, cooperating processes, threads, interprocess communication.	2
	5. CPU Scheduling Basic concepts, scheduling criteria, scheduling algorithms, multi[ple-processor scheduling, real-time scheduling, algorithms evaluation. .	2
	6.Synchronisation The critical section problem, synchronization hardware, classical problems of synchronisation.	4
	7. Deadlocks System model, deadlock characterization, methods for handling deadlocks, prevention, avoidance, detection, recovery, combined approach.	2
	8. Memory Management Address space, swapping, contiguous allocation, paging, segmentation, paged segmentation.	4

	9.Virtual Memory Demand paging, page replacement, page replacement algorithms, frame allocation, thrashing.	2
	10.File Systems File concept, access method, directory strucute, protection, file system structure, allocation methods, free-space management, directory implementation, efficiency and performance, recovery.	2
	11.Secondary Storage Management Disk scheduling. Disk management, swap space management.	2
Tutorial	Multiprogramming Interrupts OS Structure Processes & Threads CPU scheduling exercises Deadlock exercises Memory Management Paging – page reference strings File Systems	
	Total Contacts Hours	**28**
14. Text	**Text books**	1. Abraham Silberschatz, "Operating Systems Concepts", 5th Edition, Addison Wesley, 1997. 2. William Stallings, "Operating Systems", 2nd Edition, Prentice Hall, 1995. 3. Gary Nutt, "Operating Systems - a modern perspective", 2nd Edition, Addison Wesley, 2000.